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by D. Bayne.

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A NEW ESSAY ON THE NERVES, AND THE Doctrine *of the* ANIMAL SPIRITS Rationally conſidered;

SHEWING
The great Benefit and true Uſe of BATHING,
and drinking the *BATH* WATERS, in
all *Nervous* Diſorders and Obſtructions:

WITH TWO DISSERTATIONS ON THE GOUT *and on* DIGESTION, WITH THE Diſtempers *of the* STOMACH *and* INTESTINES.

By *D. BAYNE*, *alias* *KINNEIR*
of that Ilk, Phyſician at *Bath*, and Fellow of
the Royal College of Phyſicians at *Edinborough*.

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TO

RICHARD MEAD, M. D. &c.

SIR,

WHEN I reſolved to offer the following Eſſay and Diſſertations to the world, the Subject would naturally have led me to inſcribe them to You, as the moſt competent and candid Judge of the Matters whereof they treat; had I not been likewiſe deſirous upon this publick occaſion of expreſſing my great eſteem for Your Perſon, and my gratitude for repeated acts of civility and friendſhip, ſince I had the early honour of Your acquaintance, when You ſo remarkably diſtinguiſhed yourſelf as Phyſician in St. *Thomas*'s Hoſpital, where I received the firſt impreſſions of the Practice of Medicine and Surgery.

THERE are among the knowing and learned few examples of that humility and condeſcenſion which You ſhew upon all occaſions to young Students, in receiving them with an humanity, which at once encourages them to a chearful proſecution of their Studies, and teſtifies Your own great concern for the improvement of Learning, and the good of mankind.

THE world would readily join with me, ſhould I here inlarge upon other parts of a character, not more univerſally known, than loved, eſteemed and admired: But whilſt I forbear what the juſtice of the ſentiments of the Publick have made needleſs on their account, and the modeſty of your own may render offenſive to Yourſelf, I am perſuaded, Neither can condemn my taking notice of a quality which would have been unpardonable in me to omit, and to which I have been ſo much and ſo early indebted.

IF I have been ſo happy as to have given in this Treatiſe any hints for the Improvement of Phyſick, or to have offered any thing worthy of your approbation, it will be no little ſatisfaction to a perſon, who is, with the greateſt reſpect,

SIR,

Your moſt Obedient

Humble Servant,

D. KINNEIR.

ESSAY

ON THE

NERVES, &c.

ANATOMY, and the general experience of mankind from their ſenſation of pain and pleaſure, demonſtrate, that all the ſolid parts of an human body, in the moſt minute points, are Nervous; and, as ſuch, they muſt proceed from the Brain, which is undeniably the ſource of all the Nerves of the body; as appears from the obſervations of *Ruyſch* on the gradual alterations in an human Embryo, and from the Treatiſe of *Malpighius*, *de Ovo incubato.*

As the Brain, and conſequently the Spinal Marrow ariſing from thence, enter ſo much into the compoſition of all the ſolid parts of the body (which is manifeſt from repeated experiments) it is reaſonable to conclude, that all diſtempers whatſoever muſt affect the Nerves in ſome degree or other. The fluids, jointly with the ſolids, compoſing the body, there are cavities and ſpaces framed in thoſe ſolids to contain the fluids: and thoſe ſpaces muſt be ſuch, and ſo ordered, as to allow them their due motion, and be ſubſervient to the increaſe, nouriſhment and life of the Animal in a ſtate of health, perfectly agreeable to all the appointments of the Creator.

THERE is a wonderful diſproportion between theſe fluids and ſolids; the former exceeding the latter in the proportion of 3. 6 to 1, or almoſt as 4 to 1, and even the moſt ſolid as the Bones, loſe above one half, as appears by experiment, which Dr. *James Keil*, in his Eſſays on the Animal Oeconomy, plainly ſhews. Hence it follows, that the cauſes of all diſorders in the human body muſt be anſwerable to thoſe proportions; *i. e.* the fluids muſt be ſo much oftener the cauſe of diſtempers, than the ſolids, as their proportions are to one another, 4 being more than 1. Hence likewiſe it appears, that the bulk of Animal bodies proceeds more from their ſucculency than their ſolidity.

THE many ſurprizing Phænomena diſcover'd by the Natural Philoſopher, in the proſecution of his ſearches, and in the courſe of various and repeated experiments, being the reſult of undeniable facts, put things beyond diſpute, which otherwiſe would appear aſtoniſhing and incomprehenſible to human underſtanding. Thus it is with regard to many things in the Animal Oeconomy, and the ſtructure of living Creatures. But without entering into a particular detail of what ſeems yet unknown, or imperfectly explained in thoſe matters, I ſhall only offer my ſentiments, with regard to the Nerves; which I have choſen for the ſubject of the following Eſſay, becauſe there hath been hitherto not much ſaid either with ſufficient reaſons to convince the judgment, or with the leaſt appearance of certainty, to determine men in the courſe of their practice, as occaſion offers in Nervous indiſpoſitions.

ART and Experience have made many things clear, which were once in darkneſs. Who could, till the tryal was made, conceive the almoſt infinite ductility of gold? Who could ever imagine, that one ounce of fine flax or cotton may be ſpun out into thouſands of yards of thread? Numbers of ſuch experiments might be mentioned to ſhew the endleſs diviſibility of Matter; but as this is infinite, ſo likewiſe is the cauſe which gave that property to Matter; a property which our finite underſtandings, though not able diſtinctly to comprehend, do yet conceive to be poſſible, becauſe our own experiments, that are only under a finite direction, diſcover to us a multitude of things which are ſtrangely amazing, becauſe utterly unknown before. Such a progreſs in diſcoveries, the effect of finite endeavours, makes us eaſily conceive the poſſibility of what we cannot comprehend, as being skreened from our knowledge by the appointment of the All-wiſe Creator and Director of all things, who hath given us faculties, not adapted to let us into the real and abſolute nature of things, but ſufficient to inſtruct us into the relation that they bear to us: It is vanity in mankind, with not being ſatisfied without proving more than God intended, or thought fit for us to know, which has obſtructed the improvement of Arts and Sciences, and introduced Scepticiſm into the world. Bare Hypotheſes can never bring us to truth: inſtead of improving our judgment, and extending our knowledge, they generally ſerve to miſlead the one, and confine the other. Diligent, exact, and well-weighed obſervations, founded upon the ocular demonſtration of facts and experiments, are the only proper means to inſtruct and confirm us in the knowledge of things within our reach, and to aſſiſt our faith in ſuch as are above our comprehenſion.

It is upon this plan that the following Eſſay runs, being founded upon experiments, and on conſtant and faithful obſervations in the courſe of Practice, which hath verified the truth of the following propoſitions.

Prop. I. That there is a *Succus Nervoſus* conſtantly conveyed from the Brain through the Nerves to every part of the body; without which there could be no ſenſation.

II. That the Animal Spirits ſo called, are not contained in the Nerves: But what can rationally be ſuppoſed to be meant by *Animal Spirits*, muſt be ſpirits exiſting in the blood only.

III. That the Nerves, in their ſtructure and make, conſiſt of innumerable fine threads ſpun from the brain, and in a manner collected and bound together in parallel lines, fitted, as does appear, to perform their office in the way and manner of filtration, or as the riſing of fluids in ſmall tubs by attraction.

FROM hence it will appear what the *Succus Nervoſus* is, and then a rational account will be given of its uſes, and of the manner of its conveyance through the body, which will be followed with ſome obſervations, and an application of the whole to Practice.

THERE is ſo near a connexion between the firſt and ſecond propoſitions, that they muſt be conſidered together, in order to explain the nature of the *Succus Nervoſus*, and diſtinguiſh it from what is commonly underſtood by the name of *Animal Spirits*. For this end it is neceſſary to begin with a deſcription of the Blood, the ſource of all the juices of the body. Now the Blood is compoſed of globules, that are red, ſwimming in the *Serum*, and forming a *Craſſamentum*, when cold and out of the body: but is ſeemingly one uniform fluid, when circulating in the veſſels and in a healthy ſtate, tho' compoſed of particles very much differing from one another, and therefore is heterogeneous. Each globule is compoſed of ſix of *Serum*, which appears red; and each of *Serum* divides into ſix of *Lymph*, and ſo on into different orders of an incredible ſmallneſs of imperceptible ſpheres, which *Leuwenbock* by his Miſcroſcopial Obſervations, and Dr. *Marten* in the Medical Eſſays of *Edinburgh*, Vol. II. have clearly demonſtrated.

THE *Serum* is exactly of the nature of the white of an egg, as appears from the experiments of its coagulation by heat, which may be carried to the higheſt degree (according as the heat is augmented) beyond the ſtandard of health or nutrition. All the principles of nutrition are contain'd in the *Serum*, which is capable of ſuch a degree of fluidity, as to paſs thro' the ultimate decreaſing ſeries of veſſels; and therefore the nutritive Particles muſt be ſo very fine, as to exhale and become inviſible: The laſt ſeries of veſſels which contain it being not diſcernable by the naked eye, this fluid, in order to paſs them, muſt neceſſarily be reduc'd to that degree of tenuity, as to become no more the object of our ſight, than Air.

WHEN the *Serum* of the Blood becomes *Lymph*, it is only by a further attenuation, as in the caſe of the white of an egg, when reduced to that fluidity, which fits it for the nouriſhment of the *Carina* or *Embryo*, before maturity in incubation. As this cannot be brought to coagulate by any degree of heat, in ſuch a condition as is mentioned, the ſame may be ſuppoſed of the *Serum* of the blood, when reduced to the like tenuity, perhaps much greater than that of *Lymph*, tho' Microſcopes ſhew each globule of *Serum* to be made up of ſix of *Lymph*.

THE diſtribution of the *Lymphaticks* are every where throughout the body, and the moſt manifeſt of them, as the receptacles of a great many *Lymphaticks*, diſcharge themſelves apparently into the *Receptaculum Chyli*, the *Ductus Thoracicus*, and into the *Subclavian Vein*, to dilute and cool the Chyle before it mixes with the Blood; and from what was ſaid before, it is endued with properties very fitting for that purpoſe.

THE *Carotids* and the two Vertebral Arteries, one on each ſide, after dropping their thick and muſcular coat, and entring the occipital *Foramen*, join all together, and make up an orbicular ſtem, from which proceed ramifications, which are variouſly woven, and curiouſly interſperſed in the *Dura* and *Pia Mater*,

ter, and then loſt in the Brain and *Cerebellum*. Theſe ſupply the head with all its Blood, along with the two Arteries, which ariſe from the external *Carotid*, which paſſing through a ſingle perforation, is diſtributed to the *Dura Mater*, and appropriated only to the thicker integuments of the *Cerebrum* and *Cerebellum*.

THE Brain then, as it is compoſed of two diſtinct ſubſtances, named *Cortical* and *Medullary*, is thus ſupplied by a full ſtream of Blood, and in great quantity continually flowing from the veſſels above-mentioned: This Blood is loſt in the courſe of circulation in the Cortical ſubſtance of the Brain, no way viſible till it is again collected in the ſinus's and ventricles, and diſcharged into the veins which return it to the heart.

MALPIGHIUS ſays, That he finds, upon examination, the Cortical ſubſtance of the Brain to be an heap of ſmall oval glands, which receive the capillary arteries and veins, with all their ramifications that belong to the Brain; and which ſend out an infinite number of fibres, that all together make up the Medullary ſubſtance, and the *Medulla ſpinalis*, from whence ſpring all the Nerves of the body.

How far this aſſertion of an intermediate gland may be hypothetical or real, I ſhall not take upon me to determine; but I am apt to think with *Ruyſch*, that the whole proceeding from the arteries is vaſcular; and likewiſe, that their infinite ſmall ramifications and evaneſcences may form a pulpy ſubſtance, ſuch as the Brain, out of which may ariſe either a ſolid or a vaſcular thread compoſing the Nerves: But this will appear clearer hereafter.

BEFORE I proceed further to explain the firſt propoſition, it will be neceſſary to ſay ſomething of the contents of Animal and Vegetable Subſtances, ſo far as they can be known by diſtillation. For tho' theſe ſubſtances receive great variety of ſhapes and alterations by the power of the fire, and perhaps it may not be practicable to find out their principles in their pure and natural ſtate, yet experiments in this way are not without their uſe in Phyſical explanations. The learned *Boerhaave* ſays, all ſuch ſubſtances (excepting a few) are made up, 1. Of Water or Phlegm. 2. Of a volatile Fluid or Spirit. 3. Of a ſaline Matter, or Salt either volatile or fixed. 4. Of a fat Subſtance or Oil, otherwiſe called *Sulphur*. And 5. Of a brittle porous Body, or *caput mortuum*.

THIS being a true Analyſis of the blood, from whence all the juices of the body proceed, as is before obſerved, it remains now to analyſe the Fluid, which the Nerves carry thro'-out the body, commonly called *Animal Spirits.* Now by experiments the *Succus Nervoſus* diſcovers (in a live creature as well as a dead one) a ſweet, oily, mucilaginous taſte, ſoft and of a clammy nature; theſe are properties and qualities very applicable to the doctrine of appoſition and attraction, which conſtitute nutrition. And *Ruyſch* in his *Adverſaria* demonſtrates the *Papillæ Nervoſæ* of the skin, which diſtinctly appear in an injected part, to nouriſh the hair, as all the hair riſes out of them. Hence it is evident that the Nervous Fluid is mere matter, which, as ſuch, having no claim to ſenſe, cannot of itſelf, being material, be the ſource of our ſenſes: neither can it, for the ſame reaſon, be the Animal Spirits in the common meaning and acceptation; for this would be ſuppoſing mere matter to be ſenſible, which is an abſurdity.

THE Animal Spirits are ſaid to be good, when a perſon is lively, chearful, and capable of all Animal actions, in ſuch a perfection as our nature will allow. But this is ſaying no more, than that ſuch a one enjoys a good ſtate of health, whence ariſeth that lively diſpoſition. What is therefore meant by Animal Spirits, is not ſo much a production of the Animal ſubſtances, as the pure effect or reſult of a *Mens ſana in corpore ſano.* For there is ſuch a reciprocal connexion and union betwixt ſoul and body, that the operations of the one and the other are variouſly determined, as either of them is affected. The very thoughts of a Man are differently diſpoſed by the influence of the humours of the body; and yet the ſoul hath ſome particular properties, upon which the body can have no effect; as the body, in its turn, hath particular actions, not ſubject to the direction or command of the ſoul. Theſe actions are called involuntary, becauſe they appear ſo to us, as in the caſe of the motion of the heart; which continues, without any attention of ours, as long as reſpiration laſts. And yet, when the heart ceaſes to move, the ſoul quits its habitation alſo; which proves, that the ſoul actuates the heart diſtinct from our will, and that the ſoul's departure is not ſo much the cauſe as the effect of death, leaving the body only, when it is reduced to ſuch a ſtate, as to be no longer ſubſervient to the dictates and operations of the ſoul according to the deſign of their union.

OUR thoughts and paſſions are involved in the very notion we frame of the Soul. Figure, Motion, and the Properties of matter, are comprehended in the idea of Body. And as the expreſſion of good Animal Spirits means no more, than that they are the reſult of the juſt harmony between ſoul and body, as in a healthy ſtate, they muſt be in a proportion to the mutual actions and ſufferings of both of theſe: but how that comes about is, and probably will always be, a myſtery to human reaſon. Nothing is more frequently heard or ſpoke of, than Animal Spirits; yet, as they are generally underſtood, they have no foundation in any Phænomenon that we know in nature; they make them a cauſe, and therefore they muſt exiſt: but this exiſtence cannot be in the *Succus Nervoſus*, which (as hath been already ſaid) being nothing more than mere matter, is neither ſenſible nor active; nor can I find their exiſtence any where elſe in the Animal, in the ſenſe wherein they are generally ſpoke of; ſo that, for my part, I can only conſider them as an effect of that harmony, which flows from the connexion and conſent of a ſound mind and body.

WHEN a perſon is low, depreſſed, and labouring under the ſymptoms of an Hypochondriack, his pulſe is ſlow, ſmall and vermicular. This proceeds primarly from the ſtate of the blood, which does not yield a ſufficiency, either in quantity or quality, of *Succus Nervoſus* to the Nerves, as to make us ſenſible of thoſe pleaſurable ſenſations within us, which occaſion a brisk and lively diſpoſition: but, on the contrary, the quality of the *Succus*, which partakes of the ſtate of the blood, being ſecreted from it, is ſuch, that it frets and vellicates the Nervous *Fibrillæ*; and the quantity thereof ſo ſmall, that the Nerves are empty comparatively to what they ought to be. Hence ariſe thoſe uneaſy Senſations, Pains, fibrillous Spaſms, *&c.* that Hypochondriacks uſually complain of; and conſequently all the Animal Oeconomy is hurt, and no ſecretion, or excretion, is performed as it ſhould be; the appetite and digeſtion is impaired and loſt, which occaſions waſtings and loſs of fleſh; the Sufferer alſo is fond of narrating his indiſpoſition to every body, being under perpetual alarms of deſpair and a diſſolution.

IT is certainly a groſs error in Phyſicians, when they attempt the cure of ſuch perſons by volatile drops and ſpirituous medicines. The momentary relief which theſe give, only adds to the diſtemper; for tho' Spirits, ſo far as they ſtimulate, and whilſt the air and fire that is in them are rarefying, do refreſh and attenuate, yet their after-effects prove that they condenſe the Fluids. This is evident in drinkers of ſpirituous liquors to exceſs, who are ſubject to aches, pains, obſtructions, polypus's, palpitations of the heart, Nervous contractions, tremblings and ſubſultory motions, *&c.* Hard ſtudy, inactivity, and want of exerciſe, will produce the ſame diſorders, as they condenſe the Fluids, and bring on an inflammatory ſtate of blood.

OUR ſenſations were appointed to warn us of the diſorders and dangers to which our bodies are liable. The uſual motions that continually attend life, and occaſion the circulations in Animals, are ordered by Omnipotence ſo, as to cauſe no ſenſations in us, in a ſtate of health, that may prevent our forming ideas, or obſtruct our meditation and reflection. We ſhould be otherwiſe under perpetual alarms, and the operations of the ſoul would be moleſted and diſturbed. The body is altogether Mechanical, and the ſoul directs the motions of the Animal Machine, ſo long as this is capable of being moved, ſo long as the parts that make up the compoſition remain intire, and are fitted to act in obedience to its impulſe, or as the diſpoſitions of the Mind and Body anſwer to one another. For if we reflect on the difference in our manner of thinking when we are in the height of a fever, and when the diſtemper is removed; when the ſtomach is loaded or filled with a plentiful meal, and when we are faſting in a morning, we may by theſe relations, between the condition of the body and that of the ſoul, eaſily comprehend what influence our good or bad ſtate will have upon our ſenſes and imagination. The reſult of good health is life, vivacity and joy; and when a man's ſenſes lie under no load or obſtruction that may affect his ſenſations, ſuch an one would be ſaid to have good, lively ſpirits, as if theſe really exiſted in the Nerves, or elſewhere; whereas all that can be meant by that expreſſion, is only the reſult or effect of health: which condition alſo is more conſpicuous in ſome than in others, in equal health, and that may be owing to a peculiar configuration and ſymmetry of parts.

IT would be abſurd to ſay, that the ſenſitive faculty, called the ſenſes, the imagination and underſtanding, are three different or diſtinct faculties of the ſoul; as the feet, hands, and head are three different parts of the body: for it is the ſame ſoul, the ſame thought, that proceeds in thoſe different manners, which having different names aſſigned to them, have by that means come to be conſidered as ſo many different ſpecies of perception. Nor would it be leſs abſurd to ſay, that joy and pleaſure, which depend upon one of the faculties of the ſoul, *viz.* the ſenſitive, are abſolutely produced by ſomewhat in the Nerves, or what is called Animal Spirits, or *Succus Nervoſus,* which being intirely corporeal, can neither feel nor be ſenſible: ſo that without confounding our notions of materiality, we cannot ſuppoſe there are any ſuch things as Animal Spirits (in the uſual acceptation of the word) that can produce ſuch effects, as have hitherto been univerſally aſcribed to them.

SALT and Phlegm, being mixed, will make up a ſpirit. This I can eaſily grant to ſubſiſt in Animal bodies; and it is in truth the only Animal Spirit: But to endow this Spirit with a faculty peculiar to the ſoul, is going beyond all reaſon. Yet how often do we hear it ſaid, when an Hypochondriack is complaining of the ſevereſt pains and univerſal uneaſineſs, that his Animal Spirits are out of order; a ſort of cant of no meaning nor uſe. To ſay, in ſuch a caſe, that the *Succus Nervoſus*, or the Nerves themſelves, are in a diſorder, is ſpeaking intelligibly, and is agreeable to experience and practice; when a man's underſtanding is loſt, or greatly impaired, and his reflection interrupted by whims and fancies, of which Hypochondriacks are full, theſe effects and ſymptoms plainly ſhew, that the Organs of ſenſation are hurt; not the *Anima*, but the Nerves and Brain, by which the ſoul operates whilſt in the body. That ſhe makes uſe of theſe as her inſtruments, appears from obſervation and experiments: but the manner how is only known to the firſt Cauſe Omnipotent. " The " Inveſtigation of the laſt and firſt cauſes in " Metaphyſicks and Phyſicks, is neither neceſ- " ſary, uſeful, nor poſſible to a Phyſician (ſays " *Boerhaave*); but yet it may be maintained,

" that all is truly demonſtrated in Anatomy
" and Chymiſtry mechanically; as alſo in
" Phyſicks, ſo far as the ſimple and plain ſuc-
" ceſs of experiments can prove."

Though the ſoul exiſts of itſelf, yet whilſt connected with the body, her faculties muſt (as is evident to every underſtanding) ſuffer in ſome degree upon the leaſt error of conſtitution, ſhe not being able to exert herſelf ſo well when the body is in a ſickly condition, as when it is in a ſtate of health. In her turn ſhe acts likewiſe as ſtrongly upon the body; and we may daily obſerve aſtoniſhing alterations in the Animal, from the exceſſes of joy, grief, and fear; the ſoul in ſuch caſes being ſo overpowered with tranſport or depreſſion, as ſometimes to occaſion death, forgetting, as it were, her proper office, and putting a ſudden ſtop to all the motions of the body. 'Tis the exceſs only of our paſſions which renders them hurtful; they are rather beneficial when they are moderated, and move in conformity to the health of the body, wherein they exiſt.

The common notion of Animal Spirits, being thus exploded, and thoſe appearances and effects uſually aſcribed to good Animal Spirits exiſting in the Nerves, being ſhewn to be only the reſult of a *Mens ſana in corpore ſano*, it ſtill remains to be explained, what Animal Spirits properly are, and where they are to be found. Now all Animal bodies yield a ſpirit or fire, and phlegm; but as Spirit is nothing but ſalt and phlegm, or water, mixed together, ſuch a Spirit ſubſiſts primarily in the blood of Animals. Activity or ſluggiſhneſs are the conſequences of this mixture; and according to the combinations of theſe, and the predominancy of one over the other, the Animal is more or leſs vigorous and healthy; for a Spirit in the blood duly compoſed, preſerves the humours or juices from putrefaction, as it keeps up heat and motion in the circulating Fluids. After the firſt impulſe given to form life, the motion of the heart and arteries is kept up or ſupported by the quantity and ſtrength of a ſpirituous, elaſtick and expanſive fluid, the Blood. As all the other juices of the body are derived from thence, ſo they have all a dependence upon one another, for the producing of health or ſickneſs after they are ſeparated from the blood, and come under their particular denominations for the purpoſes allotted them in the Animal Oeconomy. If the blood does not come up to the healthy ſtandard of nature in goodneſs, ſo are the reſt of the juices unfit for the ſupport of health: For as a due conſiſtence and proper quantity of blood are neceſſary to carry on the lively motions of circulation, ſo alſo a due tone of muſcular fibres and others is requiſite for the ſame purpoſes; and this tone depends ſolely upon the blood and fluids, and can never ſuffer but by external injuries, unleſs the fluids deviate from that healthy ſtandard of nature (as I have ſaid.)

Hence it is evident, that what there is of an Animal Spirit in the body, muſt be made out of the blood; and that the juices ſecreted from the blood, muſt only have ſuch a proportion of that Spirit of the blood, as is neceſſary for their different uſes. But as the exact quantity and degrees of tenuity of that Spirit, thus communicated to every different fluid of the body, cannot be determined, we muſt be ſatisfied with knowing, that of conſequence it muſt be ſo; this being not a bare Hypotheſis, but ſupported on a good foundation. How far indeed our methods of trial and experiments, in finding out the principles of bodies, may affect and change the body itſelf, is a thing uncertain: nor can the exact differences between the fluids of the ſame perſon when alive, and when dead, be fully known: It is however ſufficient, that we are certain from experiments, that the blood is ſo compoſed, as is ſaid above; which is further corroborated by experience in the curative way, when founded upon theſe principles. As for the *Minutiæ* of the Animal Oeconomy in the combinations of Fluids, which may be infinite, the knowledge thereof, were it poſſible to be attained, would ſignify little towards the cure of diſtempers. As long as the general principles are certain, a practice founded upon theſe, coinciding with juſt obſervations of the cauſes, effects, and ſymptoms of diſeaſes, as well as of the nature, operation, and efficacy of remedies, is a ſufficient light to enable a Phyſician to form his judgment of a caſe with ſome certainty, and to preſcribe accordingly. Perhaps ſome perſons may be apt to ſlight the profeſſion out of a notion, that all they do muſt be gueſs-work, becauſe they cannot explain the *intima naturæ*, and render them intelligible; not conſidering there are many things certain, though there are ſome unknown; that, according to the uſual courſe and wiſe appointment of Providence, we have reaſon to think, that the knowledge which God hath qualified us to attain in nature, is more uſeful to us than what he hath ſecreted out of our reach, and is indeed all that is neceſſary for us; and that it is an impoſſibility, and down-right contradiction, that a finite underſtanding ſhould comprehend all the works of Infinity; and that with regard to every thing in nature, even the moſt (tho' after all imperfectly) known, we have ſtill reaſon to ſay, *Marvellous are the works of God, and paſt finding out!*

THE next thing propoſed was, to ſhew the ſtructure of the Nerves as they appear upon diſſection, which may be different from what has hitherto been generally imagined of them, and how they perform their office. I took a ſection of the trunk of the Crural Nerve three inches long, and carefully ſtripped it of its external membrane, which incloſed it as a *theca* or ſheath. This done, the Nerve appeared as a bundle of threads compoſed of many different bundles, each of theſe being incloſed in the ſame manner within its own *theca*, all lying parallel to one another, like ſo many ſmall cylinders, ſlightly joined or ſticking together by tranſverſe fibres, running in an oblique direction up and down. This I obſerved in pulling them ſideways aſunder, when they ſeparated the whole length of the ſection, as threads of flax or cotton would do, ſticking together without being twiſted. Each of theſe threads appeared by the Microſcope, to have an external covering or *theca*, and appeared tranſparent; for one, no bigger than an horſe-hair, (which with a fine needle I divided into twelve diſtinct threads from the middle, without breaking one, to the end, holding by the other end of the ſection) reſembled a teſſel of fine flax at the divided end; and applying them to the Microſcope, each of theſe divided fibres appeared as if ſolid, and very tranſparent, with many ſmall fibres ſticking out from their ſides, which were thoſe that connect the Nervous filamentary tubes together, and were torn from their ſides in the ſeparation. From all which I obſerve,

1. That all the Nerves are, in appearance, fine ſolid threads, ſpun or drawn out from the marrowy ſubſtance of the Brain and *Medulla ſpinalis*, and univerſally cloathed with a membranous covering from the *Pia Mater*; and they grow firmer in their progreſs after paſſing out of the ſcull and vertebers.

2. That a certain number of thoſe threads go towards compoſing a thread no bigger than

an hair (and without all doubt to a greater and moſt inconceiveable fineneſs) which, for diſtinction ſake, I have called a bundle.

3. That each bundle ſeems to be contained within a ſheath or *theca*, as appears in the experiment; and that every conſiderable Nerve or Trunk is a collection of many of thoſe bundles, contained within its proper *theca*.

4. THAT each bundle ſo conſtituted, and collected to make up a conſiderable or viſible Nerve, is connected by tranſverſe fibres in an oblique direction; and alſo, that this order of covering, ſeparation, and connection, may be the ſame in their moſt minute and undiſcernible ramifications.

5. THAT all theſe bundles lie parallel to one another, as ſo many equal cylinders.

6. THAT the ſected portion continued of the ſame length without ſhrinking, as other veſſels do; as alſo, after dividing the bundles, they remained as long, even to the 12th diviſion: but upon ſtretching them, theſe laſt became longer, and ſtill remained ſo, without returning to their former length (as a hair will do).

7. THAT they are ſtrong and tough (which may be owing to their *Theca's*); for a filament no bigger than an hair, required a good pull to break it, which ſnapped at once without ſtretching, as a hair does when drawn to be broken.

8. THAT I could perceive a ſenſible elaſticity in pulling the Nerve ſideways, though hardly any longitudinally. This, I apprehend, proceeds from their common coverings or *theca's*, and the different bundles within receding from one another, which the oblique fibres that connect them will ſuffer them to do. This is more manifeſt in a trunk of Nerves, upon pulling the bundles ſideways, after it is ſtripped of its outward *theca*, by which it loſes its roundneſs and compactneſs, becoming flatter and more oval, even by lying on a board.

9. THAT as each bundle has its *theca*, or is, as it were, contained in a tube, and many bundles are attached together by fibres to make up a conſiderable Nerve or Trunk, it is thence evident, that there are cavities and ſpaces, even in a tubular form, all along the exterior body of a Nerve, or nervous filaments, which may be ſufficient for the progreſs of the Ner-

vous juice, and to carry nouriſhment to the Nerves, upon a ſuppoſition that they are not tubular themſelves, which no diſcovery by the beſt glaſſes ever could make appear that they were: Yet that is not a good reaſon to ſay they are not tubular, ſince the curious preparations by injections of the beſt Anatomiſts afford us ſtrong reaſons to think that the whole body in its minuteſt parts is tubular. But let that uncertainty concerning the Nerves, with regard to their ſolidity, and their being hollow, remain uncertain, as I am apt to think it will ever continue ſo: tho' by what is attribute to the Nerves, would ſeem to favour both opinions; therefore I hope, by what has been ſaid, and will follow from thence, ſome clearer notions may be formed, than what perhaps have occurred to others, from which ſome improvements in the practical part of Phyſick may proceed, and greater inſight, by thoſe that are more curious and learned, from the hints I have given.

WHEN any Nerve branches out, diſſections ſhew that a bundle of filaments, with a *theca* incloſing them, divides from the trunk, breaking through the common *theca* of the trunk, as a branch of a tree does through its bark:

and as this carries it back along with it in its firſt progreſs, ſo does a Nerve; the moment it ariſes out of the brain, carries along with it a peculiar production of the *Pia Mater* as a covering: and then many of thoſe nervous filaments ſpun from the *Medulla* being collected together, before they paſs out of their bony caſes, are covered with a ſtronger coat from the *Dura Mater*: and this ſeems to be particular to every bundle of Nerves (many of which conſtitute a trunk) before they paſs out. As nature hath determined that each bundle of filaments, in its progreſs, ſhould branch off to this or that particular part from the main trunk, ſo likewiſe it ſeems as if each of theſe branchings were determined, at their very origin, to this or that particular part of the body, ſince they ariſe diſtinctly out of the brain, and are ſo carried on till they branch off in the manner mentioned to every part and place of the body. For a large body of Nerves, or a nervous trunk, is like a rope compoſed of many threads, which may be divided from one end to the other into ſo many diſtinct threads.

THE whole Animal fabrick diſcovers a ſort of ſenſibility in every, even the minuteſt point (as before-mentioned): and a Nerve is an ordinary inſtrument of ſenſation, as appears from compreſſion and a ligature upon a Nerve. When any part or member loſeth its ſenſation, it loſes at the ſame time all action and motion, and ſoon decays and grows ſmall. In cutting a Nerve, there ouzes out from it a juice limpid and clear, which is a proof that they carry a juice, and therefore there muſt be hollow ſpaces, whether in the *theca*'s, or in the filaments themſelves, or in both, it matters not: But that they carry a juice is plain from experiments, tho' not perhaps in the manner as in ſanguiferous or other tubes, they having no correſponding veſſels, as the veins are to the arteries. Hence they may be ſaid to be both ſecretory and excretory, as they convey a liquor which is prepared in the Brain and *Medulla*, part of which flies off in perſpiration, and other diſcharges, and part returns to the blood and lymph again through the coats of the veſſels, for animal purpoſes, to be explained hereafter.

THE medullary ſubſtance of the brain being of ſuch a fine texture, ſo ſoft and delicate, as hardly to admit of the touch, without abrading ſome part of its continuity, the nervous filaments, at their firſt riſe, muſt therefore be very tender, and they acquire no ſtrength or firmneſs in their progreſs throughout the body, but what they receive by their connections and coverings from thoſe two membranes, the *Dura* and *Pia Mater*. Thoſe marrowy filaments alſo lying parallel to one another, cannot of themſelves be ſuppoſed in any degree elaſtick; but the membranes that cover them, and the oblique fibres that connect them, being compoſed of elaſtick fibres, do eaſily account for conſent, vibration, undulation, and the other Phænomena of the Nerves, which have hitherto been miſ-explained, from a ſuppoſed elaſticity in thoſe ſoft filaments, and by groundleſs compariſons of a Nerve to a fiddle-ſtring or cat-gut, than which nothing is ſtronger for its bigneſs, and its elaſticity is owing moſtly to the twiſt it gets in the making, as every Muſician well knows.

The idea we have of Elaſticity, neceſſarily ſuppoſeth a firmneſs in the conſtitution of the body, which has extrinſically a power of reſtitution, when pulled or diſplaced by any power or violence. Now the compoſition of a Nervous *Fibrilla* is perfectly inconſiſtent with ſuch power, and the experiment of my learned and worthy friend Dr. *Alexander Stewart*, puts it out of queſtion. For making a ſection of equal lengths of an Artery, Vein and Nerve *in ſitu*, he found that the Nerve remained ſtill of the ſame length, but the other two did not, and the artery ſhrunk more than the vein, as being of a ſtronger, firmer texture, and compoſed of more elaſtick fibres than the vein.

As all the tubes and hollow fibres originally ariſe from the heart, and all the Nervous *fibrillæ* from the *medulla* of the brain and ſpinal marrow, ſo they are wonderfully diſpoſed, whether viſible or inviſible, throughout the body, mixed and interwoven one with the other, that, as before obſerved, not the leaſt point thereof is found without numbers of both. For each miliary gland under the skin receives a Nerve and an Artery, and ſends out a vein and an excretory duct or veſſel, that ſerve to diſcharge the matter of perſpiration, and by the *Papillæ nervoſæ* being kept ſucculent, the hairs grow, and the *cuticula* is nouriſhed and made moiſt, which becoming dry and over-heated, the ſenſe of touching muſt be much impaired, if not quite loſt.

Now a Fibre, in its ultimate diviſion, is mere earth or duſt, without *Æther* to join it, and make it what is called a Solid; for ſuch is the conſtituent of all Animal parts: and the firmneſs or coheſion of parts in a Fibre is effected by a fluid of the moſt ſimple elementary nature. For the *moles* of a body is form'd by the appoſition of the moſt minute *corpuſcula* into different ſhapes and forms, by the help or addition of fluids to make them cohere. This ultimate Fibre muſt be a ſolid, and by expanſion reſolves into the ultimate membrane, which curving, forms a cavity, and this cavity uniting, forms a tube; all which increaſing, form a body. Thus the firſt *ſtamen* is by aſſiſtance of a fluid unfolded, to the increaſe of a body, compoſed of fleſh, tubes, ſolid threads, (if there are really ſuch) blood and bones. All which, upon evaporation of their fluids, loſe their coheſion, and become mere earth and duſt.

Having ſhewn what a Fibre is in its ultimate minuteneſs, and what the Nerves are in their compoſition, very different from the other tubular ſtructure of the body, ſo far as can be ſeen, (perhaps, what is not to be ſeen may be a ſolid, and may be a tube, as I have ſaid; but as I am only to reaſon upon what is diſcoverable) it remains now to explain in what manner it is moſt rational to think the Nerves do ſecrete their juice, conform to the theory founded upon the experiment mentioned before. Now the foregoing Mechaniſm of the Nerves induces me to think the manner of the diſtribution of the *Succus Nervoſus* muſt be ſimilar to filtration. Thus filaments, or threads immerſed in a fluid at one end, will in a given time diſcharge at the other end whatever quantity of fluid is contained in the veſſel, where they are immerſed; and the operation in this way of filtration or diſtillation will commence the ſooner, if the threads are wetted all over with the ſame fluid at firſt. This is performed by the attraction of the coherent particles of the fluid; which attraction is evidently ſeen in the experiment of pipes, of different diameters, immerſed in any fluid; for thoſe of the ſmalleſt bore will attract the fluid moſt, and according to them we find it to ſtand the higheſt. There is the ſame cauſe for the aſcent of Fluids in threads of cloth by filtration. Now the attraction of a Fluid may be carried on in threads, whatever their poſition may be, without the aſſiſtance of other impulſe; though it cannot be ſhewn in pipes, unleſs in an erect poſition, and that to a certain degree of height, whereas by the ſtructure of a thread cohering together by ſide-fibres, the liquid moves on to the very ends of every diviſion, (let them be innumerable or in what poſition ſoever) ſo long as there remains any liquid in the fountain.

This experiment of filtration by threads or cords is ſooner and better performed by threads that are twiſted looſely, and only ſo much as to make them form into threads, and thoſe threads ought to be made of ſuch a matter as is moſt ſoft and fibrous; and for this reaſon, threads made of cotton, as they will moſt eaſily form into ſuch, are fitteſt for the experiment. Hence it comes, that the leſs they are twiſted, there are the more ſpaces for the liquid to enter; for many of thoſe cavities or ſpaces would be ſtopped up, were the threads more twiſted, and poſſibly the cords may be overtwiſted to ſuch a degree, as intirely to prevent any filtration.

Hence it follows, if filtrating threads lay, or could be made to lie, exactly parallel to one another, and were only connected by tranſverſe fibres without a twiſt, the filtration would ſuffer in no reſpect, but go on without interruption; and the cloſer they were connected, the finer would the filtrated liquor be, that flowed from threads in ſuch a direction. For take a cord compos'd of a great many fine threads of cotton; twiſt them together, ſo much only as not intirely to hinder the filtration, and immerſe them in water or a liquor of a red dye, the diſtillation will be limpid: but take a cord of the ſame bigneſs, compoſed only of two or three large yarns of cotton very looſely twiſted, and immerſe in the ſame liquid, the liquor will filtrate with its red colour.

Now, by the ſtructure of the Nerves before-mentioned, it appears that they are admirably contrived for a conſtant uninterrupted filtration, as their filaments lie in bundles parallel to one another, and joined together without any twiſt, and incloſed in their *theca*'s or ſheaths, which emit tranſverſe fibres for their connection in ſuch a manner and contrivance that no Art can imitate, ſo as to prove the reſemblance exact in every reſpect: but yet there is ſo ſtrong an analogy betwixt the filtration in threads of cotton, and that in the Nerves, as appears from their ſtructure, that it is very natural and eaſy to be conceived and allowed; as attraction muſt carry on their ſecretion, when the impulſe or force of the heart muſt be intirely loſt before it reaches the infinitely ſmall ramifications that prepare the nervous juice.

HEAT unqueſtionably is in a higher degree within the *cranium*, than any where elſe within the body, as appears from many things in Anatomy. And it is very neceſſary it ſhould be ſo, where there is ſuch a wonderful fine Fluid to be ſecerned as the *Succus Nervoſus* is. The ſteam of every Fluid proceeds from its rarefication, and that rarefication is as the degrees of heat. Now, as the impulſe of heat, joined with the diaſtole and ſyſtole of the Arteries, which form an action of preſſure, are concerned in the nervous ſecretion, the filtration of this nervous juice muſt be in a proportion to thoſe cauſes, both with regard to the fineneſs of the Fluid, and the celerity of its motion in and thro' the Nerves. The heat is in the blood, and the protenſion and preſſure from the arteries within the *cranium*, and muſcular motion without it. Theſe are helps towards the nervous filtration, which are not found, nor can be experimented in common filtration. Thus the blood is rarefied in proportion to its own heat and motion within the veſſels, ſince the impulſe of heat in a fluid is the cauſe thereof. This heat is abſolutely neceſſary to make the Nerves perform their offices; for the *Succus Nervoſus* can only enter them when in a due ſtate of tenuity, produced from the diviſion and rarefication of the blood, in ſuch ſort as to paſs all the ſmalleſt of tubes, which prepare it for that inviſible nervous ſecretion; ſo that of all the juices in the body this is, and muſt be the pureſt and fineſt, all the other juices moving in viſible veſſels and ſpaces, as injections do teſtify.

A ſingle Nervous *Fibrilla*, juſt iſſuing out of the *Medulla*, though collected with others in bundles before they go out of their bony caſes, always continues of the ſame ſmallneſs to its termination where-ever it happens; that our ſenſations may be regular, and the conſent of parts uniform and conſtant, through the uninterrupted filtration or progreſs of the *Succus Nervoſus* keeping them in due order, which would otherwiſe happen, were they groſſer in one part than another; as the attractions of the particles of the *Succus Nervoſus* would be different in one part of a *Fibrilla* being ſmall, and another part of it being greater, as before obſerved in the aſcent of water in ſmall tubes, from their different diameters, it will riſe higheſt in the ſmalleſt tubes. There are plexus's, knots or ganglions, as they are called; but the *Fibrilla* muſt be the ſame in them, though it would appear otherwiſe, thoſe only happening in ſuch parts where two trunks meeting and joining in order to alter its direction ſideways to any particular part, where it forms an angle of one ſort or other; and this ſeems to be a general appointment of nature, where angles were neceſſary to be form'd in order to ſupply ſome parts with Nerves aſide, that could not otherwiſe be by its firſt direction: And as all angles, in ſuch a ſtructure as the Nerves, might retard and obſtruct their filtration or ſecretion, (from whence would follow great diſorders) nature has ordered a looſer connection of the nervous bundles in all thoſe places within their common *theca*'s, which makes a Plexus or Ganglion. Theſe Plexus's may be ordered for other wiſe purpoſes in the Animal Oeconomy not yet diſcovered; but as they do not prove original *Fibrillæ* to be groſſer in one part than another, but only that their bundles are more removed from one another in particular places, we may thence conclude, that as the *Succus Nervoſus* is of the ſame tenuity and fineneſs in every part of its progreſs and filtration, it is alſo of the ſame nature as well when it iſſues out of the brain and *medulla*, as at the ultimate diviſions and terminations of the Nerves; and this is to be conſidered of in a ſickly ſtate as well as in a healthy one.

As univerſal Senſation proves the univerſal diſtribution of the Nerves through every part of the body, as well internal as external, ſo, where they appear in greater abundance, as on the inſide of the ſtomach, and under the nails, *&c.* the Senſation is more exquiſite in thoſe than in other parts; ſo we ſee Anatomy inſtructs us clearly in their origin and ſtructure, and ſhews us that they carry from the brain a fluid brought thither by the blood, and found by experiments to be the preſerver and ſupporter of thoſe organs of our ſenſes the Nerves, for ſo ligatures and preſſure demonſtrate them to be, ſuch obſtructions deſtroying as well the ſenſations of a part to which it belonged before, as its capacity of action, occaſioning waſting and decay.

BEFORE I proceed further to explain the nature and uſes of the *Succus Nervoſus*, it will be neceſſary to ſay ſomething concerning the Animal Motions, by which life is continued. Now Animal life is preſerved by a plain alternate motion of ſyſtole and diaſtole of the heart, that is, its contraction and dilatation.

'Tis by this Motion of the heart and lungs, which is communicated thence to others, that all the fluids of the body are prepared and fitted for the increaſe and ſupport of every part thereof; and theſe fluids ſo prepared, keep up that Motion conſtant and uniform, from whence health proceeds.

ALL theſe Motions within the Animal ariſe from the heart, the contraction and dilatation whereof keep the whole machine in order, provided they are uniform, and come up to the firſt ſtandard of health. For whenever there happens any deviation from the perfection and regularity of that movement, there follows an error in the fluids, and then the ſolids are attended with complaints and loſs of health in ſome degree or other; and all faults in the fluids, and diſorders in the ſolids, affect the ſyſtole and diaſtole of the heart.

THE Heart of man, and of all living creatures, was at the firſt creation ſet in motion by God: but the Almighty's work being finiſh'd by the creating of Male and Female for the perpetuating the Race, this Motion hath been ſince deriv'd from the effects of generation. The movement was undoubtedly perfect in our firſt parents,

rents, who were deſigned to live without complaints or diſeaſes; but that ſtate of perfection laſted no longer than their obedience, which fell out before *Eve* was pregnant; and ſince that time none have ever enjoyed the like perfect health or happineſs. Luxury and mixture have now corrupted our taſte, which otherwiſe, by its ſenſations of pleaſure and pain, would have diſtinguiſhed that which it ſhould ſeek from what it ſhould avoid, as ſurely and exactly, as that of other animals, that have not been corrupted by the commerce of men.

As theſe two Animal Motions of contraction and dilatation of the heart depend chiefly upon the blood, the *Succus Nervoſus*, and the action of the lungs, ſo the operation of this *Succus* upon the Nervous *Fibrilla*, ſhould ſeem to aſſiſt or occaſion the contractile, and the blood the dilative motion. For tho' extrinſically a fleſhy fibre is contractile, and manifeſtly diſcovers a *Vis reſtitutionis*, or Elaſticity, (as is proved by inciſions on animals, as well when living as immediately after death) yet the heat hath no ſooner left the body, but this elaſticity or contractile power is evidently diminiſhed, if not almoſt deſtroyed, in ſingle fibres. So likewiſe, as the expanſive motion or diaſtole proceeds from the blood, it muſt be conformable to the *impetus* and quantity of blood impelled into its receivers.

Now as the Nerves accompany all the arteries and ſanguiferous veſſels, ſo far as they can diſcern in Anatomy with the help of glaſſes, it is not unreaſonable to think, that the ſame order is preſerved through the whole body to their ultimate diviſions; ſo that it is by the contraction and dilatation of the blood-veſſels, and the heat of the blood, that warmth is preſerved in the Nerves, and the ſecretion of the *Succus Nervoſus* is promoted, otherwiſe the external cold would entirely deſtroy it. For the contractile motion of the ſanguiferous tubes in the brain occaſions a diſcharge of what they contain into the ſubſtance of the brain and *medulla*; which ſubſtances are more diſtended, and become more ſucculent by the ſyſtole of the arteries, and conſequently by the diaſtole of thoſe veſſels the brain and *medulla* are preſſed (as it were) ſo as to become leſs turgid, more empty, and fitter for the reception of the next ſupply, at which time the veins receive the returning blood, and the Nerves are filled with their juice.

HENCE it appears, that the dilatation of the heart and that of the brain exactly correſpond; for as the heart is in diaſtole, when the arteries are in ſyſtole, ſo is the brain dilated with receiving the blood by the contraction of the arteries, the ſame as it is in the heart. Hence, when the brain is compreſſed by the diaſtole of the blood-veſſels, the Nerves receive a freſh ſupply of *Succus*, which keeps up their fullneſs, and conſequently the perpetual waſte is ſupplied. Thus, when the arteries are filled with blood from the heart, the Nerves are ſupplied with their juice from the Brain. Thus, when the Arteries are full, ſo are the Nerves; and for the ſame reaſon, when the heart is contracted, ſo is the brain compreſſed; ſo that both motions are kept up by the aſſiſtance of one another; for as the heart ſupplies the blood to the brain, ſo the brain ſupplies *Succus Nervoſus* to the heart, without which Palpitations, Syncopes, would enſue, and all motion in the end be deſtroyed.

THE Nervous juice by experiments, when the creature is alive, and after death, appears to be different from all the other juices of the body, more limpid than the fineſt Lymph in the Lymphaticks, and, as I ſaid before, of a ſweetiſh, oily and mucilaginous or ſoft nature. Theſe are qualities very agreeable to the purpoſes of preſerving thoſe marrowy tender *Fibrillæ* (of which the Nerves are compoſed which are viſible) in a proper tone for animal ſenſations and motion, as alſo for perpetuating the ſecretion of the juice in the manner hinted, conſtant and uniform, without uneaſineſs or diſturbance to their ſenſibility. The oppoſite qualities of acidity, watery or thinneſs would produce painful ſenſations, and a too ſpeedy and inconſtant or irregular ſenſation, which muſt produce complaints and diſorders of various ſorts; ſo that the ſoft and ſweet quality of the juice ſeems to be the ſtandard of nature for health. And as there is a great analogy between theſe qualities and the marrowy ſubſtance of the brain, with regard to appearance and taſte, it is not improbable that this *Succus Nervoſus* nouriſhes the Nerves, as well as keeps them in a proper order for their functions. In like manner as the *Succus Nutritius* is carried by the evaneſcent arteries to the fleſhy parts, ſo is the *Succus Nervoſus* carried by the evaneſcent Nerves to the nervous parts, both being found every where; the redundancies and ſuperfluities of either are perſpired, and make up the perſpirable matter.

As the juice is that nouriſhes, ſo will that part be that is nouriſhed thereby, in point of taſte in a great meaſure: thus we find in the brains of animals a ſoft, ſweet, and clammy taſte; and in all the moſt Nervous parts, a greater delicacy of taſte than in any other. Such being the analogy betwixt the *Succus Nervoſus* and the *medullary* part of the brain, it is natural to conclude, that it is the *Succus Nervoſus* that nouriſhes the Nerves, *Medulla Spinalis*, and the Brain alſo.

THIS Doctrine is ſtill more confirmed by what occurs to daily obſervation, particularly in all Paralytick diſorders; for whenever any member loſes ſenſation, it not only loſes motion, but alſo decays and grows ſmaller; being not ſo full of juice, by reaſon of the defect of the *Succus Nervoſus* in the Nerves of the part, it neceſſarily becomes ſmaller; and becauſe the Nerves are not nouriſhed, it withers and decays, tho' the circulation of the blood ſtill ſubſiſts in the part. Theſe facts plainly prove the obſtruction of the Nerves of ſuch affected parts, when it happens, as experiments do, that a ligature upon a Nerve will deſtroy all ſenſation below it, ſo far as the branches of the Nerve are emitted.

There is an objection made to the perviouſneſs of the Nerves; and thoſe who ſtarted it ſay, That were the Nerves pervious to any juice, the Nerve that is tied would grow bigger, and ſwell above the ligature, as other veſſels do, agreeable to the direction of the fluid therein moving, from whence they haſtily conclude, that a Nerve has in it no juice. But this objection ariſes only from a miſtaken notion of the ſtructure of the Nerves, which are not altogether like other veſſels, viſibly hollow like tubs, with a quick circulating fluid in them; and this difference prevents their ſwelling above the ligature, as others do; for the Nerves, as before deſcribed, are not viſibly canalar, but that a juice paſſes them in the manner of filtrating threads by the laws of attraction: this removes the objection, and accounts alſo for the Phænomenon whereon it is founded. For a Fluid moving on cords by attraction of particles, will move no longer than the contact laſts, one drawing on another to the end: take that off by compreſſion or ligature, all below will run off, and the threads grow dry, and all above will remain as at firſt when the ligature was tied, without further diſtention or tumor, as the motion cannot be carried on longer than by the attraction being continued by contact; therefore by intervention of preſſure or ligature, that is taken off, and there is no more drained from the fountain, the threads remaining the ſame, no fuller than at firſt: Whereas in diſtractile canals the contrary will happen, where the veſſels are capable of a large diſtention, and the fluid, as in the blood-veſſels, is ſet in motion by the force and impulſe of the heart.

MANY notions and reaſonings about the Nerves, I allow, muſt be hypothetical, where all is not diſcernible, as in other parts of the animal body; but in ſuch caſes where facts, experiments and obſervations are wanting, we ought to reaſon by analogy, without which all hypotheſes are uncertain: for forming hypotheſes without attending to facts, is often the production of error, and apt to miſlead, in place of clearing up a point, and conſequently can be of no ſervice or uſe to mankind; for it is good to our fellow-creature, which ought to be the end of a Phyſician's knowledge, and the rule to direct him in his reſearches. If we cannot with all our faculties diſcover the abſolute nature of things, we can ſtill find out the relation which they bear to us, and their tendency either to preſerve or obſtruct health.

If we know not the ſeat of the ſoul, or the manner of its operations on the body, (which if we did, would ſtill be of no ſervice to us, nor enable us to make it act otherwiſe) we at leaſt know, that the Nerves are the chief inſtruments which the ſoul, whilſt in the body, employs for the diſplay of its faculties; and it is ſufficient for us to know ſo much of the inſtruments as to be able to aſſiſt them when unfit for the impreſſion of the ſoul; and more than this Providence did not intend us to know, or qualify us to diſcover. When a man is in pain, I know ſome Nerve is hurt and affected: when he has loſt ſenſation in any part, I know the Nerves of that part are obſtructed, and want the juice neceſſary to preſerve them in their tone and order, which fit them for communicating their impreſſions to the ſoul. When I find any one labouring under madneſs, convulſions, epilepſies and lethargies, I know that the *Genus nervoſum* is hurt; and rationality being deſtroyed with involuntary motions, and ſuſpenſion of action, I conclude in general the brain is affected, as all the Nerves ariſe from thence.

All this in general, and much more may be learnt from Anatomy, Obſervation and Experiperiment: tho' why ſuch cauſes ſhould produce ſuch and ſuch effects, and why the Nerves ſhould be the ſeat of the ſoul's government more than any other part of the body, and the inſtruments of its actions; theſe, I ſay, be, like the other *intima naturæ*, above the reach of human reaſon; ſo that ſearching after them ariſes from an unwillingneſs ſome men have to allow of any thing they cannot account for; this is but miſ-ſpending of time, which may be employed to a better purpoſe in uſing and improving the light we have.

THE Obſervations ariſing from this light; That,

1. THE Nerves are the inſtruments of all our ſenſations, and operate either pleaſurably, or otherwiſe, according to the condition of the *Succus Nervoſus* which they contain.

2. ALL voluntary and involuntary motion depends intirely upon the Nerves, and a ſuitable quality and quantity of *Succus Nervoſus.*

3. An error in the ſtructure of the Brain and Nerves, and a fault in the quantity or quality of the *Succus Nervoſus*, are the occaſion of all diſorders, properly called Nervous.

4. THE Nerves of themſelves are lax, ſoft, and compoſed of marrowy fibres, having no elaſticity, continued from their origin, conſtantly of the ſame length and ſize to their evaneſcent extremities or terminations.

5. THE Nerves may be diſtended, and ſuffer a *Plethora* from a too great quantity of *Succus Nervoſus*; and the contrary may happen from too little. The firſt produces tenſion, the latter relaxation; but this is to be underſtood laterally only, as proceeding from their *theca*'s, and the tranſverſe and oblique fibres, that ariſe from the *Dura* and *Pia Mater*.

6. THE Nerves abſorb the *Succus Nervoſus* in a manner analogous to filtrating threads immerſed in a fountain, which proceeds immediately from the brain; and that this juice is the fineſt and the moſt of an elementary nature in the whole body, when fitteſt for the animal purpoſes.

7. THE qualities diſcovered in the *Succus Nervoſus* ſhew it to be fitted for nutrition and ſupply of waſte to the Nerves; and perhaps it may ſerve to other noble uſes as yet undiſcovered.

8. As there is a ſupply of *Succus Nervoſus* brought to the mouths of the Nerves, and wrought up or ſecreted in the brain, as conſtant as the circulation of the blood thither, ſo conſequently the ſecretion of this juice in the Nerves muſt be in a *ratio* to the quantity ſeparated from the blood; and the good or bad offices of the juice muſt be in a *ratio* to both quantity and quality.

9. THE quality of this juice, good or bad, depends upon the ſtate of the blood, and the quantity is in a *ratio* to the ſlowneſs or quickneſs of the blood's circulation.

10. THE Nerves are pervious at their beginnings and terminations, both for carrying off the ſuperfluity of the juice, and alſo preſerving their ends moiſt, and in due tone for the ſenſe of feeling, as remarkably appears from the plentiful diſtribution of them under the nails and *cuticula*.

FROM theſe obſervations we may account for various experiences and effects that we ſee and feel.

1. When a man is wounded in any Nerve, he feels an exquiſite pain, and the wound weeps a clear limpid liquor; the action and motion of the part to which it belonged is hurt, with a numbneſs and pinchings all below the wound; and the part never recovers intirely that ſtrength and exquiſite feeling that it had before, but is often chilled and feels cold, and always more ſuſceptible of the impreſſions of air and weather. *Ob.* 1.

2. When the Nerves are fully diſtended with *Succus* of an healthy condition, pleaſure follows, with joy, livelineſs and activity. But if the *Succus*, tho' conformable to the ſtandard of health, be not ſufficient to fill them, then ſluggiſhneſs, inactivity, drowſineſs, impatience, ſinkings, and all the ſymptoms attending relaxation of fibres. *Ob.* 1.

3. If the *Succus* in the ſmalleſt degree partakes of an acrimony, whether it be a ſufficient quantity to fill the Nerves or not, inſufferable pains will now and then enſue, with ſtartings and ſubſultory motions, convulſions and ſpaſms of particular parts, as the Nerves ſubſervient to thoſe parts are affected or vellicated; with intervals of vivacity, if the *Succus* is in ſuffi-

cient quantity, and intervals of depreſſion, if the Nerves are not ſo ſucculent as they ſhould be. *Ob.* 1 & 2.

4. IF the Nerves proceeding from the eighth pair be tied, or cut acroſs in the neck, the motion of the heart grows languid, a palpitation enſues, and the motion in a little time ceaſes, and is intirely loſt. *Ob.* 1 & 2.

5. IF the recurrent Nerves are cut, the voice is deſtroyed, as appears from experiments. See Dr. *Martin*'s experiment on a little Pig, *Edinburgh Eſſays*, where, tho' the Pig continued to ſuck the Mother, as the reſt did, it languiſhed, and in a ſhort time died. The caſe is the ſame with muſcles; when the Nerves belonging to them are cut, action and its power ceaſes. *Ob.* 1, 2.

6. IF the brain is hurt or bruiſed by a fractured ſcull, and its texture in part deſtroyed by contuſion, extravaſation of blood, a bad formation, water lodging in the ventricles, inflammation of the membranes, and a *Plethora* in the ſanguiferous veſſels, the conſequences are, a deprivation of all ſenſe, ſtupidity, coma, apoplexies, epilepſies, vertigo's, deliriums, folly, exquiſite head-ach, *&c.* *Ob.* 3.

7. If the fleſh feels ſoft and looſe, all the circulations are languid, except when a fever comes on, and then the pulſe diſcovers a paucity of juices, or viſcidity in them; the Nerves contain little *Succus Nervoſus*, and conſequently are not diſtended; the vibrations of the lateral fibres upon the marrowy nervous filaments, are imperfect or irregular: whence flow univerſal uneaſineſs, imperfect ſenſations, and a ſuſpenſion from pleaſure and joy; inſtead whereof ſucceed gloomy and diſmal apprehenſions, ſyncope's, loſs of appetite, indigeſtions and flatulency. *Ob.* 1, 4 & 5.

8. When a perſon is of an athletick habit of body, ſtrong and hard fleſh, full of blood and juices, a *Plethora* in the Veſſels and Nerves is diſcovered by *Catalepſis*, or ſudden falling down, ſpaſms and convulſions of all ſorts, violent Hyſterical fits with uncommon ſtrength, *Tetanus*, *Priapus*, *Furor uterinus*, Frenzy, *Chorea ſancti Viti*, an intire loſs of rationality, with all involuntary actions. Several ſorts of convulſions happen alſo in caſes of inanition; but as theſe proceed from a fulneſs in one muſcle or fibre, more than in the antagoniſt, it is reducible to the ſame head, tho' cured differently. This, as well as the foregoing

example, is occaſioned by the different degrees of elaſticity and vibration of the fibres, intermixed with the Nerves of the *Pia* and *Dura Mater.*

9. THE delicate fineneſs and texture of the Nerves implies, that the fluid they contain muſt be compoſed of the moſt exquiſite ſmall particles, like to a fine vapour ariſing from an high rarefaction; this, with the qualities diſcovered in it, ſeems to fit it, as was ſaid, for nutrition and appoſition; and its progreſſion being carried on ſlowly by attraction of particles in a conſtant uniformity, convinces us almoſt of the certainty. *Ob.* 6, 7.

10. THE ſucculency of the Nerves in a healthy man, depends upon the goodneſs and due quantity of the blood, that enters the veſſels of the brain: For the blood is rich in proportion to the quantity it contains of ſuch a fluid, as is ſecreted, or can be ſecreted by the brain, and thence into the Nerves; and alſo to the quality of the blood, which can produce no inquietudes or unhealthy ſymptoms. *Ob.* 6, 7, & 8.

11. The quality and quantity of our blood (from whence all the juices of the body proceed) depend upon what is taken into the body, or the ſix Non-naturals, *viz.* air, meat and drink, motion and reſt, paſſions of the mind, things contained and diſcharged, ſleep and watching. A right or a wrong uſe of any of theſe non-naturals, occaſions a good or a bad ſtate of health, and conſequently the requiſites for good juices, as they all flow from the blood, depend intirely upon them. But whatever qualities the nervous juice derives from a wrong uſe of any of thoſe, it is only the exceſs of thoſe qualities and quantities of the blood, that produceth diſtempers; for neither will a bitter, a ſweet, ſour, acrimonious, ſaline, *&c.* in due quantities, alter the juices in their healthy ſtandard, ſo as to render them unfit for circulation, and their reſpective uſes in the Animal Oeconomy. *Ob.* 9.

12. The innumerable viſible, and, without glaſſes, inviſible terminations of the Nerves, as under the *cuticula*, (which *Ruyſch* has deſcribed) nails, inner-ſide of the ſtomach, and guts, *&c.* with the *mucus* that conſtantly appears there, when there is no obſtruction, ſhews beyond contradiction, that ſome of the

nervous juice is diſcharged by thoſe terminations, and a drineſs and parched condition of parts, is a proof of the want of perſpiration of that *mucus*, which might otherwiſe keep them ſupple and moiſt. Thus, when the orifices of the *Papillæ nervoſæ*, or *Pyramidales*, as they are called, under the *cuticula*, are not obſtructed, there is an oleaginous, ſhining moiſture upon the skin, which is certainly a perſpiration; and this I call the inſenſible and ſteamy perſpiration which proceeds from the Nerves, as I think the ſweat proceeds, and the more ſenſible perſpiration from the ſerous veſſels, which branch off from the evaneſcent arteries in the skin. *Ob.* 10.

IT ſtill remains to clear up thoſe obſervations and practices, and in order thereto, the following propoſitions muſt be laid down. As,

I. THE Fluids of the human body, in regard to their quantity and quality, ariſing from various alterations and diſpoſitions receding from an healthy ſtandard, are productive of diſtempers. In ſome people the blood may be more diſpoſed (if I may ſay ſo) to certain kinds of humours, than in others, under equal directions in the Non-naturals; and in this diſpoſition there may be as great variety as there is of faces. This variety is the reaſon why there can be no ſpecific remedy, nor particular diet effectual in all caſes; for ſimilar diſtempers require different methods of cure in different perſons, it being evident from daily experience, that one medicine will be of ſervice to one, as well as one method of diet, that are hurtful to another in the ſame caſe. This Idioſyncratical part of knowledge is not always ſo much attended to as it ought, being of the greateſt uſe in the curing art, and very frequently exemplified, particularly in the effects of Opium, and in many eatables or alimentary things. The ſame may be obſerved in many other medicines, as *Caſtor*, *Succinum*, Aloes, Rhubarb, *&c.* if Practitioners would turn their minds that way, or to find out the conſtitutional antipathies of the diſeaſed, there could not happen ſo many unſucceſsful advices; then (inſtead of gratifying a natural propenſity to ſubject all caſes to their one favourite medicine, and all cauſes of diſtempers without diſtinction to gluttony and intemperance) the *opprobrium* would not lie ſo much upon the profeſſion as it does: For, *Prop.* II. CONSTITUTIONAL Antipathies are not to be accounted for any more than the diſſimilitude of perſons or things, in all reſpects; and as this wonderful diverſity is diſcernible in all the known parts of the creation, ſo that no two perſons or things are exactly alike; ſo likewiſe is it in diſtempers of the ſame kind, which differ in ſhape and ſymptoms according to the diverſity of conſtitutions. Hence flows the neceſſity of an exact knowledge and attention founded on the hiſtories of diſtempers, and faithful obſervations, to make a good Phyſician.

Prop. III. THE combinations of the Fluids of the body, with regard to health and ſickneſs, are ſo various as not to be determined. This variety of mixtures produces different qualities, that may either preſerve or deſtroy health. So likewiſe in point of quantity, the proportions may vary and conduce to the ſame purpoſes; this variety of combinations may be almoſt infinite, and plainly ſhews, that health and ſickneſs do not depend in all perſons upon the ſame point, no more than the recovery of different people in the ſame caſe does upon one and the ſame method and medicine.

Prop. IV. THE alterations in the juices of the body conſiſt in the increaſe or diminution of their bulk in their particles, as to their ſolidity and ſize, ſhape or figure; and likewiſe as to their flexibility, ſtiffneſs, elaſticity, their various coheſions, and mutual attractions, ſo as to be eaſily or not eaſily divided.

Prop. V. NOTWITHSTANDING the many diſtinctions that may be made or happen to the Fluids of the body, yet it is not, perhaps, neceſſary to know them further, in point of drugs, than that by their too great attractions and coheſions they may obſtruct, and by a too great fluxility may fly off in too great quantities. For in ſuch caſes it is, that the greateſt benefit may be expected from medicine, whereas the qualities of bad juices are more readily corrected by Mineral waters and Bathing, with proper food and diet.

Prop. VI. THE acrimony of the juices of the body differs according to the modifications of the particles of different ſalts that impregnate them: and as the *Succus Nervoſus* comes originally from the blood, it muſt partake of the good or bad principles ariſing thence.

ALL diſeaſes incident to mankind, ariſe from ſome of the cauſes and their effects mentioned in the foregoing Propoſitions; and all methods of cure are conducted by diſcharges, as bleedings, purgings, promoting urine, and increaſing the inſenſible perſpiration; by attenuating, ſtimulating, vomiting, dilution and thickening; and, in fine, by every thing that increaſes or diminiſhes the circulatory motions, ſo as to bring them to the true ſtandard for accompliſhing all the animal functions neceſſary to a ſtate of health.

ALL Mineral Waters and Baths, with proper advice in premiſing and jointly uſing ſome one or other method along with them, as the caſe requires, are uſeful in a very high degree towards a recovery from every diſorder, in which there is no decay in any bowel by loſs of ſubſtance, ulcers, fevers, and the like: and there are ſome in moſt countries in the world fitted for different purpoſes and diſtempers. We may analyſe mineral waters, and find out the moſt predominant minerals with which they are impregnated; but ſtill there are ſuch nice combinations of them, work'd up in the bowels of the earth, that all and every particular mineral, in their due proportions, can never, in a great many of them, be found out by experiment. So that at the firſt diſcovery of a mineral ſpring, no man can poſitively aſſert what it is good for, otherwiſe than in general terms; for experience can only ſhew in what particular caſes it may be of ſervice.

To inſtance in the waters of *Bath*; it is generally allowed, and proved by experiment, that they are impregnated with Steel, Sulphur, and ſome Nitre. We know all the properties of each of theſe ingredients, and yet no art can combine them together in any menſtruum or water, in ſuch a manner as to produce effects like thoſe of the *Bath* water. There are in them ſuch fine volatile parts, that fly off very quickly, which both internally and externally are capable of paſſing into the minuteſt abſorbent pore. Their heat and volatility contribute ſo much to their quick effects, that it is immediately felt in the ſtomach, and, like to a warm cordial, ſtimulates the nervous filaments into agreeable ſenſations, and immediately paſſes into the ſmalleſt veſſels, thereby performing ſurprizing cures, particularly of all ſuch caſes as are truly Nervous, and ſuch others, as ariſe from obſtructions, and a languid circulation. *Prop.* 4, 5, 6.

MY intention in this ſhort Eſſay was not only to clear up, in ſome meaſure, the doctrine of the Nerves, and remove the prejudices entertained againſt the profeſſion of Phyſick, through the want of ſomething being made out upon that ſubject, more intelligible than what has hitherto appeared concerning the Nerves and Animal Spirits; but alſo to ſhew the uſefulneſs of drinking the *Bath* waters, and particularly of Bathing in moſt caſes, as well of hot as cold bathing, whoſe effects daily experience proves to be ſucceſsful in moſt nervous caſes, that are curable; and thoſe effects may be rationally accounted for, from what has been ſaid in this Treatiſe.

Now, in all Paralytick caſes, the Hot Bath ſhould be firſt uſed; and if the proper uſe of it (as in curable caſes it ſeldom fails) doth not procure a cure, then the Cold Bath ſhould be tried; for though we ſometimes find that neither will ſucceed, (as there are incurable palſies) yet hiſtories of undoubted credit, and daily experience at *Bath*, prove indiſputably, that many are continually cured by both. Sir *John Floyer* and Dr. *Baynard*, in their treatiſes of cold bathing, have given ſufficient evidences of its good effects. The many trophies and gifts left behind at *Bath* by ſuch as have there been cured by uſing the Hot Bath, are undoubted teſtimonies of its efficacy, every day to be ſeen in that place. So what could be the occaſion of its being ſo much diſuſed of late, or what could be the motives of ſome Phyſicians endeavours to diſcourage the practice, is not eaſy, or not agreeable, to conjecture. But I may venture to ſay, that there are but few Chronical caſes, where bathing with proper directions, joined with drinking of the waters, will not be of ſervice; always excepting ſome head caſes and hecticks ariſing from decayed bowels, by ulcer, impoſtumation, *&c.* and over-heated blood. Some caſes, where bathing has been poſitively forbid, and otherwiſe managed by my orders, have ſucceeded to my deſire; and there are many inſtances in books of the ſucceſs of bathing, and daily proof thereof, to be ſeen in this place of *Bath.*

It may perhaps appear ſtrange, that an hot and cold Bath, two methods that ſeem diametrically oppoſite, ſhould both concur to effect recoveries in the ſame caſes, as experience teſtifies. But as there is no arguing againſt matter of fact, ſo this will create no difficulty to a perſon that knows the anatomy of the parts upon which they operate (*viz.* the *cutis*) and the due motions by which we are kept in health, as illuſtrated in the foregoing theory.

THERE cannot be two principles more oppoſite to one another than heat and cold, and conſequently their effects ſhould be ſo too. Heat ſoftens, lengthens, and expands; but cold hardens, ſhortens, and contracts, as is evident in iron chains in hot and cold weather: now cold hardens the skin, which heat ſoftens; and leſſens the diameters of the pores, which heat increaſeth; ſo that it looks as if the effects of the one ſhould deſtroy thoſe of the other; and this indeed is certain, ſo far as it relates to the *cutis*, or skin.

BUT before I proceed further upon this ſubject, it will be neceſſary for me to obſerve, that I think moſt, if not all diſtempers, wherein this method of bathing either in the hot or cold Bath is uſeful, proceed from an obſtructed perſpiration; and that perſpiration may be leſſened or obſtructed, either, 1. From the quality of the perſpirable matter, in viſcidity and thickneſs, cohering too ſtrongly with the juices of the body, and is not diſcharged through their emunctories, as before hinted. And, 2. From an hardneſs, contraction and drineſs of the pores of the skin, that when the perſpirable matter comes to be diſcharged, it cannot paſs, where it accumulates and grows thick, forming obſtructions in all the outlets, and alſo a compreſſion upon the extremities of the veſſels and *papillæ nervoſæ*, which prevents it intirely, and by conſequence a fulneſs of veſſels and all its conſequences muſt enſue, unleſs the redundancy is carried off ſome other way. As perſpiration may be ſtopped by the one as well as the other of theſe cauſes, ſo that obſtruction may be remedied by means widely differing from one another. For inſtance, The Cold Bath upon immerſion ſo ſhakes and compreſſes the whole nervous ſyſtem, that even the minuteſt capillaries feel the influence; and the preſſure, with the ſudden chill, produces ſuch an *impetus*, as to criſp the fibres, and force open the ſmalleſt paſſages. By this means the velocity of the circulating fluids is increaſed, and the impending load diſcharged through the pores of the skin; and inſtead of keeping back the perſpirable matter, which had contracted ſuch qualities as to occaſion the various complaints for which the Bath was adviſed; the frequent dippings freely diſlodge what affected the nervous termination with uneaſy and painful ſenſations; ſo that after bathing, one is briſk and lively, and feels a lightneſs and agility of body, as oft as he repeats the practice, by which we find the motion of the blood is accelerated, and the *Succus Nervoſus* duly diffuſed through the Nerves, from an increaſe of pleaſurable vibrations, and a recovery of the decayed ſpring in the muſcular fibres and veſſels.

IT is true, that through a miſunderſtanding either of the caſe or the method of operation of cold baths, they have proved often unſucceſsful, and even prejudicial to many people, when preſcribed; but this may be accounted for by obſerving, that there may be often ſomething peculiar to the conſtitution or caſe, that may forbid the uſe of thoſe baths, ſuch as corpulency, unſound viſcera, the ſpring of the veſſels worn out with old age and debauches, and alſo too great a load of thick viſcid humours, ſo impacted, that they cannot get thro' the ſkin. For if the fibres are ſo ſtuffed round, as in fat people, that they have not ſpace to play, vibrate, or contract, being ſo much on the ſtretch, the ſudden ſqueeze or impulſe of the Cold Bath can have no effect, but will ſtrain them to no good purpoſe, and perhaps tear, and conſequently weaken them. For whenever an effort is made to remove any thing by an elaſtick body, if the firſt exertion fails, every *impetus* afterwards languiſhes, and the ſpring is hurt or ſpoiled: and in unſound viſcera, or when any part is much weaker than the reſt, ſuch an additional force will preſs the fluids upon thoſe parts greatly to its hurt, by either burſting the veſſels, or promoting the flux of ſome vitiated humours upon them, which otherwiſe might be diſcharged ſome other way. For this reaſon it may be ſaid in general, that in moſt caſes where the Cold Bath can be of ſervice, it is ſtill ſafeſt to begin with the Hot Bath, and finiſh with the Cold, if neceſſary. For, as I ſaid before, except in ſome rare inſtances, there are very few caſes, eſpecially in Chronick diſeaſes, wherein the hot mineral ſprings will not produce ſurprizing good effects and recoveries, when the moſt efficacious remedies or medicines have been long uſed in vain. And as there is no danger in the Hot Bath at firſt, where it is properly adviſed, and there may be ſome in the Cold, and as in ſimilar caſes, they both have good effects, I would recommend it to every body, as a general rule, to begin with the Hot, as the ſafeſt way; and if the cure be not thereby compleated, then to try the Cold, by which method he will run no riſque, as has been already obſerved.

To explain the operations and effects of the ſalubrious and efficacious ſprings of the city of *Bath* in *Somerſetſhire*, from their component parts, would require more Phyſiology than I am maſter of, and, as is ſaid before, the combinations of mineral fluids, work'd up in the bowels of the earth, are ſo nice and various, that it is impoſſible to analyſe them exactly by any experiment whatever, or to fiſh out every individual part in their true proportions: Let it ſuffice then to obſerve what is moſt predominant in them, and to reaſon *à poſteriori* from their effects. That there is a ſteel in the *Bath* water, is very perceiveable by the taſte; and it is otherwiſe evident, that it greatly abounds with a volatile mineral ſulphur, which ſoon flies off and evaporates, being intirely loſt upon growing cold. The mineral matter with which this water is impregnated, from its effects may be ſaid to be a ſoft, deobſtruent, and ſubaſtringent Balſamick: ſubaſtringent implies a ſalt in the compoſition, and ſulphur is never to be met with, even in the ſublimed flowers, without ſome portion of ſalt, which, when boiled in oil, as in making the balſamick ſulphur, ſhoots like needles, or the branches of *Sal Armoniac*. Hence we may reaſonably conclude, that the waters, in their ſubterraneous courſe, muſt bring a ſalt along with their ſulphur, ſince this laſt is never found above-ground without the other; and more eſpecially, as water attracts ſuch particles, and is a more natural *menſtruum* for ſaline bodies, than for thoſe that are purely ſulphureous. They may be compared to a fomentation, which both relaxes and ſtimulates the parts all over the body at once, and by undulating and ſtrengthening the fibres, the vital motions are increaſed, tho' ready before to be at a ſtand. Thus, in Paralytick caſes, pains, aches, contractions, humours ſtagnant and fixt, furring of the veſſels by gouty matter, and in fine, in all diſtempers ariſing from acrimony and pungent ſalts, from obſtructed perſpiration, and obſtructions of the bowels, excretory and ſecretory glands, the Nerves not performing their offices for want of a due ſupply of *Succus Nervoſus*, &c. I ſay, in all thoſe caſes, drinking the waters, bathing and pumping, as the caſe requires, will be of the utmoſt ſervice, and have ſucceeded when all other means availed nothing.

BATHING all over, more eſpecially the head, and ſtanding over the ſprings, do wonderfully open that almoſt infinite number of excretory orifices upon the ſurface of the skin, and clear thoſe cutaneous ducts, by ſoftening and diſſolving what matter may be therein accumulated, and thickened or cruſted, thereby cauſeing the obſtructions. Theſe breathing ducts being open, and the impacted matter diſſolv'd, way is made for the fluids and ſolids to perform their parts, and return to their healthy ſtandard. The water inwardly taken, and directed for the cure of inward obſtructions, and debility of fibres, ſuch as weak ſtomachs, worn out with luxury and debauch, gout, and illneſſes of a like nature, cholick and dry gripes, diſtempers of the kidneys and urinary paſſages, and in fine, all Hypochondriacal and Hyſterical illneſſes, flatulencies, ſpaſms, *&c.* I ſay, the waters drunk at the pump in ſmall quantities, and under the direction of an honeſt Phyſician, joined with bathing in them at proper times, will have ſurprizing ſucceſs in theſe and moſt curable Chronick caſes: but without bathing in them, many, whatever illneſs they labour under, (which does not reaſonably forbid it) will find a ſlow progreſs in their amendment, as is evident from daily experience. Bathing indeed hath of late years loſt its credit in the opinion of ſome of the Faculty, tho' in the firſt ages of the medicinal appointment of the *Bath* waters, the ſole dependence was upon bathing, drinking of them being in diſuſe for a long time, till the late Dr. *Guidot*'s time. Thus people have been taught to deſpiſe and neglect a natural and ſimple method of cure, provided, as it ſeems, by Providence, for the general relief of mankind, under the moſt ordinary diſtempers to which they are ſubject, and warranted as well by the continued experience of all paſt ages, as by ocular demonſtration in the preſent. How this experience comes to be ſlighted, and why the uſe of bathing is now ſo much diſſuaded and neglected, may not perhaps be a proper inquiry. I never ſaw a good reaſon aſſigned for it; and where conjectures may occaſion reflections, they ought not to be indulged.

Whoever knows the ſtructure of the *cutis* or skin, and conſiders how many diſtempers are brought upon us by an obſtructed perſpiration, and with what readineſs and eaſe this is reſtored by bathing, as is evident from daily experience; whoever, I ſay, conſiders theſe things, cannot, with any ſhew of reaſon, diſpute its good effects. Beſides the relief it gives barely as a fomentation upon the external parts, in moiſtening, ſoftening, and waſhing away all the filth and morbifick matter, that may lodge in and obſtruct the pores, there is alſo a medicinal virtue conveyed into the blood by the abſorbent veſſels in bathing, which will have quicker and more immediate effects upon the capillary veſſels, and the fluids contained in them, than drinking the waters can have; for before it can have any effect upon thoſe more remote parts, a long time muſt be ſpent in the courſe of circulation, and conſequently the virtue of the water muſt be loſt to a great degree, before it can arrive at thoſe extremities of the veſſels, to which the abſorbents of the skin are ſo immediately related.

THE inward uſe of the waters indeed is well adapted for the relief of any worn-out or decayed bowel, as when the ſtomach and guts, and all the chylopoctick powers are to be aſſiſted, which are thereby in a manner bathed, and may ſucceed without bathing the external body; but if thoſe diſtempers, and the like, ariſe from bad blood and juices, occaſioned by a want of perſpiration, as generally they are,

then

then bathing muſt be added to promote the cure, which otherwiſe cannot be ſo ſoon or thoroughly affected.

WHAT will ſet this in a clearer light is, That every body, who hath experience of curing the Pox, ſees frequently, in ſome caſes, that hardly any inward method and medicine will ſignify and reach the diſtemper; and yet, in ſuch caſes, the cure is effected by unction. This is a plain demonſtration, that there are obſtructions in the capillaries removed by the immediate application of *Mercury*, conveyed by the abſorbents, when before given inwardly, it could not tranſmit its powers thither by internal uſe.

BY bathing, the medicinal virtues of the waters are very ſoon conveyed into the blood: and that they may, and do operate upon it in this way, is not to be denied. Salivation, we ſee, is brought on by anointing with the mercurial ointment. The quick effects of bliſtering plaiſters upon the urinary paſſages in producing a ſtranguary; garlick applied to the feet, and ſoon ſmelt in the breath, with many other inſtances of the like nature, aſcertain the exiſtence of abſorbent or inſpiring veſſels in the skin.

THAT bathing of the head hath been much neglected, and has been intirely laid aſide (if ever in practice) amongſt the Ladies, appears from their coming to *Bath* with fine dreſſed heads: but I cannot ſee the reaſon of this cuſtom; ſurely, whoever promiſeth himſelf benefit from bathing, and is deſirous to prevent headaches, and ſinkings, ought to plunge his head often, during the time he is in the *Bath*, and take care to dry the hair afterwards; this prevents an over-diſtenſion of the veſſels in the head, which may be occaſioned by a greater determinate flow of blood thither from the heat of the water upon the immerged body, and is prevented by often dipping the head. There is likewiſe a ſpeedier conveyance thereby made of the ſalubrious effects of the water to the ſcalp and brain, contributing to promote the ſecretion of the *Succus Nervoſus* into the Nerves. Rubbing alſo in the time of bathing all over with a ſponge or bruſh, I take to be of great uſe, for facilitating the paſſage of the volatile ſtream through the inſpiring veſſels.

THE many wonderful recoveries from all paralytick diſorders, old fixed pains, leproſies, and all cutaneous diſtempers, nervous and ligamentary relaxations, in ſhort, all chronick diſeaſes proceeding from an obſtructed perſpiration, and a lentor upon the juices, ſufficiently prove the efficacy of bathing. But as there may be an abuſe of the moſt certain means, and a failure of the beſt remedy, from a general direction, and by an indirect uſage, no body ought to make the trial without proper advice; it being probable from ſome ſuch a cauſe, that the general diſuſe of late years originally commenced, and hath ſince continued.

S*ANCTORIUS* and Dr. *Keil*, both of them great men, and indefatigable in their phyſical recherches, have left behind them works ever to be had in admiration by all the ſons of the phyſical profeſſion, as by their doctrine of perſpiration they clear up to us points of knowledge, which renders the practice of Phyſick rational, and more certain than it had ever been before their time. For faults in the inſenſible perſpiration, and ſenſible perſpiration, are more evidently and commonly the cauſe of more diſorders, than any defects in the other natural excretions. All the other, taken together, fall very ſhort, in a healthy ſtate, to the quantum of perſpiration, as appears from their calculations: But allowing it to be equal only (in theſe our northern climates) to the whole excretion by ſtool and urine, it is evident from thence, that more diſtempers muſt ariſe from an obſtructed perſpiration, than from an obſtruction by ſtool or urine; and conſequently the increaſing and promoting of perſpiration, muſt produce a quicker and more certain method of cure in moſt caſes than purging and diuretick medicines. Dr. *Pitcairne*, in his Diſſertation on the cure of Fevers by evacuations, hath ſhewn, that in a fever or any other diſtemper, the cure whereof is to be effected by evacuations, there is a much greater probability of removing them by perſpiration than by ſtool.

INANITION and Repletion may be ſaid to be the two general cauſes of all diſtempers, without enumerating all the particular qualities of juices, which do but in great meaſure ariſe from thoſe cauſes; ſo that, in truth, all the practice of Phyſick moſtly depends upon filling and emptying, properly ſpeaking. Thus bleeding and purging, diaphoretick, diuretick medicines, and in a word, all things that ſerve to increaſe the natural evacuations, are comprehended under the latter; as attenuating, alterative and deobſtruent medicines, volatile, ſtimulating, and incraſſating ones, may be reduced to the former. There may indeed, in many caſes, be contra-indications; thus there may be ſymptoms of inanition, when the caſe proceeds from repletion; and on the contrary, of repletion, when it really proceeds from inanition: and in ſuch, a miſtake may be hurtful, and of very bad conſequence. But theſe are eaſily diſtinguiſhed by an experienced Phyſician, who accuſtoms himſelf to juſt and exact obſervations in the courſe of his practice; tho' ſuch as have only one method, and one cauſe for all diſtempers, can ſcarce fail of committing enormous blunders in ſuch caſes, as well with regard to the cure, as the prognoſticks of a diſtemper. The like miſtakes will be made by thoſe who give into hypotheſes unſupported by experiments, who found every thing upon Acid and Alkali, particular ferments, occult qualities, and ſuch like extravagancies, or who fancying every particular diſtemper to ariſe from a particular ſort of food and diet, imagine it only to be cured by ſtarving, or eating by weight, and drinking by meaſure, as if all conſtitutions were exactly the ſame. It were to be wiſhed ſuch Schemiſts would make impartial obſervations in their practice, without wreſting things to flatter their favourite ſchemes, or elſe they may do a great deal of miſchief to mankind. But to return.

As obſtructed perſpiration is the cauſe of many diſorders, acute as well as chronick, the cure of ſuch diſorders is obvious, *viz.* by depletion, in ſuch methods as the perſon can beſt bear, and which the ſymptoms indicate. But (as I have hinted before) the ſame method and medicines will not always ſucceed with different perſons in the ſame caſe; bleedings and ſtrong catharticks, or even weak ones, will ſo far diſagree with ſome conſtitutions, that they ſhall ſometimes ſuffer more from ſuch means, than from the diſtemper itſelf; ſo that thoſe methods are moſt eligible, that are able to remove the diſtemper with the leaſt danger, and of as little trouble to the patient as poſſible. Of this nature are gentle vomits and bathing in moſt curable chronick caſes proceeding from an obſtructed perſpiration. In acute caſes we muſt often have recourſe to quicker methods, becauſe in ſuch there is no time to be loſt, in regard of their ſudden tranſitions, and nature likewiſe can generally bear a puſh better in them, than in other caſes. But ſtill we muſt act with caution, in ſuch manner as not to precipitate any of the natural diſcharges, and in no method but what is agreeable to experience, and hath been found ſucceſsful in the recovery of perſons in the like caſes: of all methods, none hath been more effectual, and none (I am ſatisfied) can be uſed with greater ſafety, than that of cuticular diſcharges by perſpiration.

How many inſtances have we, both at ſea and land, of the recovery of perſons in fevers by immerſion in the ſea, and cold water, which never failed of forming a criſis by a profuſe ſweat. But as this diſcovery owes its riſe to the dictates of nature in the ſick, expreſſing his longing deſire to be ſo treated, I do not recommend it as a method to be followed in general, but where they are bent upon it to have it done; but I mention it to ſhew the great uſefulneſs of promoting ſweating; and that as an obſtructed perſpiration is either primarily or ſecundarily the moſt common cauſe of diſtempers, ſo the promotion of it is the moſt common way of removing and curing them.

THERE are innumerable examples (ſome of which moſt people muſt have learned) of the moſt extraordinary longings in fevers, who being indulged in them, have received their cure, by falling afterwards into ſweating. I am certain of ſeveral men being dipped in the ſea, and never without ſucceſs, when it was found their inclinations bent that way, from their ravings and talking, and even ſome of them would get out of bed to throw themſelves over-board; and ſome have actually been drowned upon ſuch an occaſion, when their watcher has been out of the way. I have known a ſervant boy recover, (that uſed now and then to taſte of his maſter's bottle) and the criſis form by ſweating, from drinking near a pint of Brandy, which his maſter indulged him upon his calling out for it in his delirium. Dr. *Hancock* hath furniſhed us with many inſtances of the good effects of drinking great draughts of cold water in fevers. A Lady under my care, in the coming out of the ſmall pox, inſiſted upon having a bumper of Red Port, which ſhe at other times diſliked, and being allowed it, took the bottle and glaſs, and filled herſelf three large glaſſes, almoſt a pint, and drank them with pleaſure, upon which the vomitings ceaſed, and the ſmall pox appeared, and came out plentifully; ſhe recover'd, and is now very well; whereas, before the ſmall pox, ſhe was under perpetual nervous diſorders, low ſpirits, tremblings, ſtartings, *&c.* But there is no neceſſity of dwelling longer on this point of the great uſe of perſpiration, ſince every reaſonable perſon muſt be convinced by what *Sanctorius* and Dr. *Keil* have wrote on the ſubject. It is ſtrange however, that no greater uſe is made of what they have ſo clearly demonſtrated, and the mode ſhould govern as much in Phyſick as it does in dreſs. A leading man in his profeſſion, takes a fancy to ſome methods of practice; others, out of complaiſance to his perſon, or deference to his authority, adapt the ſame into theirs. Hence it comes, that the *Sanctorian* Doctrine is ſo little minded and improved. Hence it comes, that the method of cure by bathing in chronick caſes is ſo much decried, and ſo generally diſuſed, when heretofore Bathing was the only remedy; ſome now run upon exceſſive bleedings, purgings, emeticks, *&c.* Indeed, a diſcreet uſe of one or more of theſe, as the nature of the caſe does require, may pave the way with greater ſecurity for a plentiful diaphoreſis:

phoreſis: but it is chiefly from this laſt, that the cure is to be expected; and if it was more generally promoted in practice, more lives would, in all probability, be ſaved, than there are.

IN moſt, if not all inflammatory caſes, bleedings are neceſſary: but it is a miſtake to imagine, that all the cure depends upon bleeding. It muſt be uſed with proper cautions, otherwiſe it may kill, which I am afraid it has too often done, particularly in pleuriſies, as I have often found, upon being ſent for too late, after ſuch abuſes had been committed. It is well known to every body, that in ſuch caſes the blood is ſizy, glutinous, and highly inflamed, and that there is a painful ſtitch in one ſide or other, affecting the breath, proceeding from an obſtruction, whence follows an inflammation of the *pleura*, with a ſpitting of blood, when the lungs are affected, and a full, hard, and quick pulſe. Theſe are ſymptoms which demand bleeding, to leſſen the quantity of the blood, that the *impetus* in the ſmall veſſels may be increaſed, in order to remove the obſtruction, and to carry on the circulation in the inflamed part, and to form a ſpitting of the morbifick, which may be thrown upon the affected parts, and cauſe an *Empyema.* But yet, if the bleedings are too frequently ordered, regard being had to no other ſymptom beſides the pain, the perſon muſt infallibly ſuffer, and either a ſuppuration or death enſue; for by emptying the veſſels, the contractality of the ſmall ones is thereby deſtroyed, and the force taken off, by which the obſtruction was to be removed, and the ſizy matter ſeparated and diſcharged; whereas if care be taken to keep up the vibrations of the veſſels, and *impetus* of blood, by a conſtant ſupply of medicated decoctions, apozems and drinks proper in ſuch caſes, at leaſt in double quantities to the blood taken away, this can hardly fail of ſucceſs, if the perſon be, in all other reſpects, ſtrong and ſound, as I have very often experienced. There is ſtill another obſervation in theſe caſes, that the pain is not ſo much to be regarded as the pulſe, and the difficulty of breathing in order to regulate phlebotomy. For as is the fulneſs and hardneſs of the pulſe, ſo is the diſtemper, either upon the decline or continuance, and as ſuch, a pulſe is a certain attendant in all thoſe caſes; ſo a ſoft one, with a free breathing and ſpitting, prognoſticates a cure, and the pain goes off intirely, followed with a very thick water, which during the exiſtence of the diſtemper, was high-coloured and clear.

I cannot upon this occaſion forbear mentioning one, which fell under my care: A young Lady, fifteen years of age, and to that time often ſickly and ill-coloured, was ſeized with a pleuriſy. On the 4th Day I was ſent for, and found her exceeding ill, with all the ſymptoms uſual in ſuch a caſe very ſtrong upon her. On the 8th, when I expected ſhe would die, upon the application of a *fotus* to her pained ſide, the ſuppuration which was formed, broke in leſs than two hours thereafter, with a noiſe to be heard by the attendants, ſhe crying out at the ſame time, that ſhe was eaſy, and that ſomething like cold water went acroſs her from the place which had been the ſeat of the pain. In ſhort, ſhe voided in a few days the pus by urine, and continued to do ſo to the quantity of a quart; which, after ſubſiding in the water, I carefully collected. Thus was my intention anſwered, in giving her diuretick apozems, and the fever, which begun a little before ſhe paſſed any of the pus, quieted by proper means; ſhe recovered,

vered, and is at this time, ſix years being elapſed ſince her cure, in perfect health.

THERE are ſeveral inſtances I might mention of ſuppurations in the like caſes, cauſed by miſmanagements prior to my being called, who have recovered by coughing up the matter, and are now living witneſſes of the facts: the caſe above-mentioned is very remarkable: that which follows is not leſs curious. A Farmer in the country, a robuſt ſtrong man, from a violent fixt pain in the region of the liver, and a ſymptomatick fever, waſted exceedingly for upwards of two months that it continued. After a great many preſcriptions to no purpoſe, he was prevailed upon to take a medicine of the Antimonial and Mercurial preparations blended together in a bolus, which created ſuch emotions in his belly with ſuch ſickneſs, that his parents thought he would have died; but the abſceſs breaking, he diſcharged it by ſtool, and the cyſt alſo, as I took it to be, for it was like a piece of ſheep's skin. This is now about ſeven years ago, and the man is as ſtrong and hearty as ever, at this time ready to teſtify the truth thereof.

BUT to return and ſhew that Hypochondriac and Hyſteric caſes owe their beginnings to an obſtructed perſpiration, and an irregularity of all the animal ſecretions: The primary cauſes thereof are either luxury, too intent and conſtant ſtudy, ſloth and lazineſs, or want of labour and exerciſe, great and violent evacuations, eſpecially by purging, depreſſing paſſions of the mind from diſappointments or otherwiſe; in fine, every thing that produceth a lentor in the blood, and conſequently in the other juices, which may interrupt the regularity of the animal ſecretions and excretions. Any one of theſe cauſes may, in the end, bring on all the manifold and unaccountable complaints and ſymptoms that attend nervous diſorders. For, as it appears from what hath been before obſerved, unleſs the mutual action and reaction of the fluids and ſolids, created by the firſt impulſe when life was given, be kept up to the ſtandard of health, a diſeaſe muſt of courſe enſue; and that falls under different denominations by the appointment of Phyſicians, according to the different parts affected.

THUS in Hyſterical and Hypochondriacal affections; we know them by what is called lowneſs of ſpirits, an heavineſs and diſlike to action, fancies and whims, perpetual fears of dying, a continual propenſity to tell their own complaints to every one they ſee; an imagination ſo diſturbed, as to make the infirm perſon think he feels every body's ſufferings that he hears of; from all which it is evident, that in theſe diſorders the mind is diſturbed, and that the Nerves, and nervous juices, are in fault; and as the ſtomach and bowels are variouſly affected in ſuch caſes, eſpecially with flatulency and diſtention, when they are at their worſt, it does appear, that the Nerves of thoſe parts by conſent do convey to the brain their uneaſy ſenſations, which affects the mind in ſuch manner as I have ſaid. Thus the ſtomach, whoſe inner coat is made up of nervous terminations, as it were from its vellous appearance, would ſeem to be principally concerned in theſe diſorders, from the pain and ſpaſmodick contractions of its fibres, attended with diſtenſion, eructations, ſcaldings or cardialgies, loſs of appetite, obſtructions and conſtipation, frequent *nauſea*, and diſcharges of bile and choler, *borborigmi*, and an irregular periſtaltick motion, which keeps the wind or flatulency pent up from going either upwards or downwards, thereby occaſioning a pungent acrimony, that vellicates and pricks the Nerves of the parts, whence ariſe various complaints from their convulſive motions and contractions, diſturbing the whole *Genus Nervoſum*, and producing aches and pains in different places, great diſcharges of a limpid urine, and generally a coſtive belly; tho' ſometimes incommoded with a looſeneſs, which ſinks them, and exaſperates the ſpaſms; and at other times a continual ſpitting. This being the caſe, an univerſal waſte follows, through a want of due nouriſhment, and aſſimilation of the little quantity of meat and drink taken in all Hypochondriacal and Hyſterical diſorders, or Vapours ſymptomatically ſo called.

HENCE (as I have ſaid) the cauſes aſſigned, or whatever induceth a lentor on the fluids, or leſſens the ſtrength and contractility of the fibres, and thereby occaſions ſluggiſh and languid circulations and ſecretions, muſt of conſequence bring on all chronic illneſſes, eſpecially Hypochondriac melancholy. Now as this ſtate of body is attended with an irregularity of all the animal excretions, the body muſt ſuffer in proportion to the defect of that excretion which was greateſt in a ſtate of health, and that is undoubtedly perſpiration. The promotion therefore of this excretion is to be laboured by every means that is moſt tolerable to the diſordered perſon; and as none is ſo ready, or ſeems ſo likely to produce that effect as Bathing, we are plainly directed to the uſe of that method. This, with gentle, but continual exerciſe, and a very few other directions in medicine, (which a Phyſician may ſee neceſſary for ſome particular complication) will much ſooner and ſurer effect a cure, than all the ſtrict diets of particular things and *farrago* of medicines, which very often bring on ſome other more dangerous diſtemper, than what they are intended to cure.

WHEN the organs of digeſtion, and all the emunctories concerned in that operation, are affected, as does immediately appear from ſymptoms, we may aſſuredly conclude that perſpiration is ſtopped. Thus flatulency and windy diſtenſions proceed from a retained perſpiration, wind being only perſpirable matter retained in the body, and which, acquiring a volatile acrimony in the bowels, raiſes pains, ſpaſms, and convulſive motions, that ſtop the exploſion thereof, as we daily find in Hyſterical and Hypochondriacal caſes. For viſcid, ſharp and acrimonious fermentative humours (the production of what we eat and drink partly, and alſo of what is diſcharged into the ſtomach and guts by their glands from a morbific ſtate of fluids, occaſioned by what goes before, particularly by an obſtructed perſpiration, and a bad digeſtion) pave the way to moſt diſtempers, both acute and chronical, incident to men, women and children. Indeed, if we may judge from experience, the ſeeds of moſt illneſſes ſeem to ſpring from the ſtomach and guts, from whence they are derived, to the blood and other juices, and thence to the ſolids; ſo that diſtempers of either may be as various, as the different combinations of their conſtituent parts, or the infinite diverſity of faces and conſtitutions.

It may probably be here expected, that ſomething ſhould be ſaid concerning Diet; but as that matter is ſufficiently exhauſted in the ingenious Treatiſe of Aliments by Dr. *Arbuthnot*, I ſhall add nothing to what is there ſaid; only as he ſays, that wholſome and unwholſome are relative, not real qualities, we may juſtly infer, that there is no affirming a particular thing to be wholſome or unwholſome, without deſcribing the ſubject in all its circumſtances to which it bears thoſe relations. For different food and drink are requiſite for different intentions, and are to be ordered as different conſtitutions of perſons require; ſome one, ſome another kind of aliment; ſome more, ſome leſs in quantity. A weak, lax fibre, diſcovering debility, will require food and drink directly oppoſite in quantity and quality, to a ſtrong, rigid and elaſtick ſtate.

HENCE appears the abſurdity of eating and drinking by weight and meaſure, and the inconveniencies that may attend the preſcribing of a vegetable and milk diet indiſcriminately to all perſons and in all caſes alike. Indeed, in ſeveral caſes ariſing from a ſaline acrimony in the juices, the diſtemper, after proper preparations, may be much mended by ſuch a diet, with the white meats and drinking of water. But this is to be ordered in ſuch a manner, and no longer continued, than it anſwers the intention of ſweetening the juices; and as no other method will do ſo well, with this or the other man, it is then only neceſſary and to be tried: ſince by other means the ſame may be effected with leſs danger to the conſtitution; for if this regimen be long continued, and is ſtrictly a vegetable and milk diet, there is no returning to a fleſh diet, without uſing the utmoſt caution. As from a vegetable diet, there is ſo much danger of deſtroying all the natural powers, and of falling into the worſt kind of fevers, ſuch as are hardeſt to be cured, from the loſs of ſtrength and an univerſal relaxation brought upon the fibres by ſuch a diet; ſo, whenever a ſweetening regimen is followed, it muſt be managed only in ſuch a manner, as that the perſon, when well, may return to a more ſtrengthening diet without any danger, which may be done with as much effect, as can flow from the ſtricteſt milk diet towards a cure, and that is, by now and then eating ſome ſolid meats, of ſuch a nature, as do not contra-indicate the intention of a cure by milk and vegetables. For a long and ſtrict milk diet does ſo relax and weaken all the chylopectick powers, as well as the whole ſolid fabrick, that it is not to be wondered at, if the leaſt alteration to a freer diet ſhould raiſe ſuch dangerous tumults in the conſtitution as to endanger life.

Hence alſo appears the neceſſity of continuing in ſuch a courſe, if once entered into, in all its ſtrictneſs. This neceſſity is ſo great, that unleſs the patrons of ſuch methods can from examples make it evidently appear to be the only method of cure in the caſe in queſtion, no man ought to adviſe it in any. For even ſuppoſing the immediate diſtemper to be removed, yet this being done by a ſtrict milk diet, an univerſal weakneſs is thereby brought upon the body, lowneſs of ſpirits, and many other ill conſequences, enumerated by Dr. *Cheyne* in his Eſſay on the Gout, *p.* 18, where the danger of abſtaining from fleſh, fiſh and wine is ſo ſtrongly repreſented, and confirmed by examples, that it is hard to deem a man in his right ſenſes, who ſhould enter into ſuch a diet, after all that is ſaid upon the danger of it by the Doctor, whoſe authority in this reſpect is not to be doubted. Nothing certainly can be more erroneous, than to reſolve the cauſes of all diſtempers into eating fleſh or fiſh, and drinking wine moderately, for all exceſs is out of the queſtion. Did theſe naturally tend to deſtroy health, God Almighty would never have indulged us the uſe of them. But the caſe is far otherwiſe; for eating and drinking with moderation, and at regular hours, of ſuch things as are found agreeable to our conſtitution, and are in themſelves, by the general conſent of mankind, allowed to be wholeſome, is, with a right uſe of all the Non-naturals, the only Rule for Health, Strength, and Long Life.

END *of the* ESSAY *on the* NERVES.

A
DISSERTATION
ON THE
GOUT.

PEOPLE of all ages above puberty, eſpecially the Males, are liable to have the Gout; women leſs than men, and children leſs than women. This diſtemper may be either regular, Spring and Autumn; or irregular as to thoſe Seaſons, and happen at any time, conform to the quantity of gouty Matter bred, and the differences of the weather.

THE Symptoms of the Gout are violent, ſhooting pains, in any of the joints, with ſwelling and tenſion on the part, as the diſtemper increaſes, which cauſes an external ſuperficial redneſs, inflammation and fulneſs in the cutaneous veſſels: all which, after a certain time, conform to the degrees of it, remit, and are removed without any other alteration in the part to ſome, then leaving a tenderneſs and weakneſs, for a little time: but in greater degrees of it, contractions, loſing the uſe of the joint by oſſifications, chalk-ſtones, *&c.* are the conſequences.

THE Veſſels of the body are Arteries and Veins which carry Red Blood, the ſerous veſſels carry the Water or Serum which is finer and thinner, the Lymphaticks contain a Fluid ſtill finer than the *Serum*, and the Nerves ſecrete what is moſt refined of all the juices. Theſe are the Orders of Veſſels by which all the ſecretions and excretions of the animal body are carried on, and motion and heat are the two powers employ'd in the combinations, aſſimilations, coheſions and fluidity, neceſſary for the preſervation of animal life, and continuation of the circulation for thoſe ſeparations and evacuations mentioned.

ALL animal food hath ſalt and earthy particles in it, with which the Blood muſt be impregnated; and the ſuperfluities are waſhed off and thrown out of the Body, by the excretions of perſpiration, urine, ſtool, *&c.* and thoſe are promoted by the proper action and natural attrition of the ſolids, in the firſt, ſecond, and third digeſtions. Such are the conditions in general, by the appointment of nature, for health and long life.

ON the contrary, the condition of the fluids, for want of due attrition and diviſion, muſt produce various diſorders, create obſtructions, the foundation of all chronick diſtempers. So,

THE condition of the fluids from over-action, and too great an attrition, is productive of all acute diſeaſes, hæmorrhagies, colliquations, *&c.*

THE heat and warmth of animal bodies is preſerved and increaſed or diminiſhed by the motion of the fluids, which is communicated by the action of the heart, and thence to each veſſel, bowel and fibre, including the whole compoſition: Therefore heat being an effect of motion or action, the degrees of it will be in a proportion to thoſe of action, and the degrees of fluidity of the juices proper for all the animal offices to be performed, will be alſo in a ratio of thoſe two jointly.

FROM an adventitious heat in too great a degree, as by ſtrong liquors, fire, and rays of the Sun, an inflammatory ſtate of fluids will happen, from the ſame action of the ſolids; for the potential heat of thoſe will ſo rarefy and expand the juices and air within us, as to ſtimulate quicker and ſtronger vibrations in the canals, which in the end will increaſe to that pitch, as to occaſion a fatal coagulum, by the waſte and evaporation of the watery and moſt fluid part: for tho' accidental heat in a tolerable degree will make the blood more fluid, yet in an exceſs, every perſon knows, it will in the end have the reverſe effect.

THESE points being premiſed; the Gout, then, is a humour attended with violent pain, which does not ſuppurate, notwithſtanding of the obſtruction and inflammation, as in Pleuriſies or Phlegmons, which proceed from an obſtruction of the ſanguiferous veſſels; therefore the ſeat of the Gout cannot be in them. Rheumatick anaſarcous Tumors or Swellings likewiſe never come to ſuppuration; ſo the ſerous veſſels, and the more watery ſecretions, muſt be the conveyers of gouty humour from the blood. Chalk-ſtones and the concretions obſervable in gouty people's joints and fleſh, diſcover what the gouty Matter is, and the excretions of Perſpiration, Urine, *&c.* diſcover an abundance of ſuch matter, as ſalts and earthy particles. It is the intimate mixture and diſſolution of ſuch particles, with the watery and ſerous part of the blood, that carries them through the fine ſtrainers in order to be excerned; and where that due combination and coheſion with the ſerous part is wanting in thoſe particles, they will ſeparate from the fluid in thoſe veſſels too ſoon, before they arrive at the excretory ducts, and conſequently will furr and adhere to the ſides of the veſſels, or concrete and petrify, where-ever they chance to reſt. This accounts for all petrifactions in animal bodies whatſoever, and verifies the ſeat of the Gout to be in the ſerous veſſels.

THE doctrine of Attraction teaches, that all liquors are more or leſs fluid, according to the greater or ſmaller coheſions of the particles, which ſwim in the watery Menſtruum; and it is likewiſe evident, that no ſecretion or excretion is performed without a mixture and coheſion of ſeveral ſorts of particles in the liquid ſecerned or excerned, as appears by microſcopial obſervations.

IF the particles which attract one another, are more powerfully attracted by thoſe of the fluid than by one another, (as in the caſe of Salts diſſolved in a large quantity of water) they can never ſeparate from the fluid of themſelves: but the contrary happening, thoſe particles of matter united with the fluid, will run together, and thereby increaſing in their gravities, and becoming ſpecifically heavier than the fluid, muſt ſettle and ſtick together in cluſters, where the force of motion and heat is not ſufficient to keep them aſunder, and no inteſtine motion happens amongſt themſelves, as in the caſe of efferveſcence and ferment; for a conſtant, equal, progreſſive motion, whether ſwift or ſlow, of a fluid, does not hinder the attractions of particles floating in that fluid much more than if it was in a ſtate of reſt; but an unequal velocity of the particles will hinder and diſturb their attractions, and by reſiling from one another, cauſe an inteſtine motion, which prevents their union.

FROM which it is plain, if the Salts and earthy particles with which the liquid excretions are impregnated, are more attracted by the particles of the fluid to be excreted, than they are by one another, their coheſions and bulks will be ſo ſmall as to be diſcharged and waſhed off in the fluid, by urine, perſpiration, *&c.* and ſuch are performed beſt when there is a plentiful dilution, an equal circulation, and a moderate heat of blood.

LIKEWISE, if the Salts and earthy particles which are carried out of the blood by the ſerous and liquid excretions, are attracted by one another, more than they are attracted by the particles of the fluid, their coheſions will be greater, and their *moles* increaſed ſo much, that they cannot go on in the circulation without ſtopping, ſticking to the ſides of the canals, dividing and precipitating in the extreme ſmall veſſels, before they are thrown out of the body; cauſing flying, throbbing pains, gout and petrefactions where-ever they ſettle, and run into cluſters before they can arrive at the excretory ducts. This happens for want of dilution, from an unequal circulation, and an inflammatory ſtate of blood.

THE Lymphaticks are a ſeries of veſſels carrying a fluid of a cooling, diluent nature, deſigned undoubtedly to attemperate and moderate the heat and rarefaction of the juices that may happen, thereby keeping up the balance equal in the attractions and coheſions of the different particles, compoſing the fluids of our bodies, ſuitable for all the animal purpoſes, to the ſtandard of health: and the intention of nature for that end is very viſible in the great diſtribution of Lymphaticks amongſt the chylopactick organs or veſſels, where they diſcharge a great quantity of Lymph, to be mix'd with the Chyle, before it mixes with the blood.

FROM what I have ſaid in the foregoing Eſſay concerning the Nerves, and the nervous Juice, there is no need of repetition; but only ſhall remark, that relaxation and tenſion of fibres depend ſolely upon the quantity and quality of the juices, when they exceed in either caſe from their natural diſpoſition. The arteries are moſt elaſtick, the veins leſs, the ſerous veſſels leſs than the veins, the lymphaticks ſtill leſs than the ſerous, and the Nerves leaſt of all, if any, as before hinted. Now from theſe general hints of the Animal Oeconomy,

nomy, every thing concerning the Gout will appear more plain.

PAIN, then, muſt proceed either from an obſtruction or acrimony in the juices: the obſtruction ariſes from particles that cannot paſs from their increaſed bulks, which occaſion tenſion, tearing aſunder, and pain: Acrimony ariſes from the different modifications of ſpiculated ſalts, which erode, cut, and burn, cauſing an acute, ſcalding pain. All thoſe ſenſations are felt in gouty pains; and in a fit of the Gout the ſwelling ariſes from a flux of ſerous humors, ſtimulated to the part, by pain; and the redneſs or inflammation proceeds from a diſtention of the blood-veſſels of the ſkin; which ſymptoms are more or leſs conform to the quantity of matter and quality lodged upon the part affected, which continue a ſhorter or longer time, as the matter is in waſting, either by the perſpiration of the part, or the prevention of a freſh ſupply, by being thrown out, or carried off in the excretions: but if the fit is long, and a continuation of gouty matter coming to the part (by not being leſſened from the natural evacuations) does happen, then the more ſolid particles will be accumulated, forming concretions, petrifactions and chalk-ſtones: Thus the veſſels are ſtuffed, cruſted, and intirely tore to pieces; the joints ſtiffened, weakened, and for want of motion, the ſynovia or juice that ſerves to moiſten the joints, thickens, oſſifies or becomes bone, forming an Ancyloſis or Orthocolon.

ALL people having bad conſtitutions, whoſe ſecretions are irregular and imperfect, muſt ſuffer by an irregularity of their excretions alſo; and according to the deficiency of either of them that can ſecrete or diſcharge moſt of thoſe ſuperfluities, which are the foundation of gouty matter, ſo is that conſtitution more or leſs gouty; and thoſe people who are regular in going to ſtool once in the 24 hours, which diſcovers a regular diſcharge of Bile, and ſecretion of the Liver, make water ſuitable to the quantity of liquor they drink, and have a moderate perſpiration, will never have the Gout: And the ſame will happen, tho' at times by ſome accident any one of thoſe excretions is deficient, if what ought to have been diſcharged is carried off by the exceſs or help of any of the other two. Thus, in caſe there are no gouty Salts carried off by perſpiration, but the urine is well ſaturated with them, and they are voided that way; and in caſe they are not diſcharged by urine and perſpiration, they may by ſtool and purgings: and this is the true reaſon why one has the Gout, and another has not; as one may have a conſtitution that ſupplies the defect of excretion by the aſſiſtance of another increaſed, which another man is not ſo happy to have.

EVERY Phyſician muſt know, that of neceſſity there muſt be a ſurplus or redundancy in every conſtitution, at certain times; and if nature does not throw that off at thoſe times, there muſt be a diſtemper or ill health: It is for that reaſon we obſerve the increaſe of one evacuation or other more at thoſe times than uſual, ſometimes by urine, ſometimes by ſweating, and ſometimes by ſtool, *&c.* and nature, in that view, has appointed a periodical one in women by the *Menſes*, and ſometimes in men by the hæmorrhoides; which certainly is the reaſon they have the Gout ſeldomer, if they have it at all, than thoſe who have not that natural benefit.

ALL the excretions of animal bodies have ſolid particles contained in them, of different natures and figures, as is evident from the ſubſidences and evaporation of the humidity or fluid; and thoſe differences appear in different places, from their ſmells, ſtains, and taſte: and theſe qualities differ in moſt conſtitutions, conform to our food, things taken, and the habit of body. The urine diſcovers great quantities of ſuch particles, upon ſettling and breaking. The inſenſible perſpiration and ſweating brings away a great deal, and what is voided in particular places, as in the feet, axilæ, and pudenda, *&c.* diſcover it to be of a very volatile and rank nature. The Saliva or ſpittle is oftentimes very ſalt, and the acrimony and ſharp pains about the Anus in going to ſtool, proceed from the ſalts carried that way. As all the veſſels of animal bodies are conical, decreaſing in their branching off and continuation to their ultimate diviſions, for the ſecretions of different fluids that ariſe out of the blood; ſo a ſerous and lymphatick veſſel muſt be of the ſame dimenſions in every perſon, to ſecrete ſerous juices and lymph; for if they were larger than the ſmalleſt blood-veſſel, their ſecretion would be red and bloody, and the excretions alſo, which can never happen but when the blood is too much rarefied and diſſolved, ſo as the red globules can enter them: hence the reaſon aſſigned for one eſcaping the Gout, and another having it, to depend upon the differences of the ſizes of the veſſels, and ſtiffneſs, is without any foundation, either from Anatomy or Animal Oeconomy; and unleſs the ſeat of the Gout was in the greater or ſanguiferous veſſels, (ſince with reſpect to them they may be of different magnitudes in different people) the notion is chimerical and abſurd. Now, as this diſtemper always attacks the joints, where the veſſels are very ſmall, the gouty matter can only lodge in ſuch veſſels, and the obſtruction cannot be in the blood-veſſels, ſince the humor of the Gout never ſuppurates; therefore the ſeat of the Gout muſt be (as mention'd) in that ſeries of ſmall veſſels which can only admit the ſerous and watery fluids, and theſe muſt be the ſame and alike in every body; for what is a ſerous veſſel in one, muſt be of the ſame dimenſions and flexibility in every one. Since then the watery and thinneſt ſecretions are impregnated with ſalts and light terreſtrial particles, being water is the proper diluent of ſuch ſubſtances or matter, it remains no queſtion if they are not carried out of the body, but there muſt be foundation for Gout and gouty complaints, left behind.

IT is obſervable, that all gouty people are bloated and look yellow, of a ſallow complexion; this is owing to the ſerum and lymph being impregnated with too much bile, which ſhews a defect in the ſecretion of the liver, and a redundancy of gall or bile in the maſs of blood; which, not being excreted naturally, or diſcharged in urine, muſt neceſſarily produce ſuch a colour in the skin, and gouty complaints. The petrifactions in the joints, gall-bladder, and urinary paſſages, bear a great analogy to one another; tho' indeed all thoſe animal fluids may be ſubject to petrify in any part of the body, which are full of ſalts, and earthy particles, when ſubſiding, and ſuffered to unite for want of heat and motion. People cough up ſtones from their Lungs, and I have ſeen two ſtones taken from under the tongue, one in a woman, of the bigneſs of a horſe-bean, and the other, of a tranſparent yellow colour, from a man, reſembling a barley-corn: books are full of examples to this purpoſe.

THE true reaſon of the Gout ariſing from what has been ſaid, and why it ſhould diſcover itſelf, firſt in the extremities, is owing to the circulation being more languid in them than in other parts; and as the ſeat of it is in the ſmalleſt veſſels, from the ſame reaſon the motion muſt be leſs in them there than in other parts; likewiſe, the extremities being more expoſed to the external air, and conſequently more ſubject to be chilled or cooled; and having leſs natural heat in them, for want of a brisk circulation, the gouty matter muſt of courſe precipitate in them ſooner than in the veſſels of any other part that is not ſo remote from heat and impulſe. Stagnations from gouty matter, when it abounds in quantity, do happen in the ſmall veſſels of the viſcera, from a languid circulation alſo, tho' they are in a warm ſituation; and this ariſes from a greater viſcidity of the juices than in common fits; which is always the conſequence of much gouty humor: and thoſe cauſes ſtill are greater when it is in the head, where it commonly is mortal.

THE Gout is a true criſis of ſuch a ſtate of juices falling upon this or the other part, according to accidental cauſes, diminiſhing or affecting the performance of circulation in thoſe parts; and therefore the extremities are more ſubject to its firſt attacks, as being ſuſceptible of more of thoſe cauſes than other parts: and as want of exerciſe, and a ſedentary life, begets the gout, ſo the confinement during a fit, and an inactivity of body, which it generally brings after, from weakneſs in the joints, *&c.* forms more matter, and introduces the conſtitution to be ever after ſubject to the diſtemper; which is one reaſon why there can be no abſolute cure for the Gout, to one that has ever had it ſtrongly. But if that vulgar error did not prevail ſo much, as to have nothing to do with a phyſician during the fit, from the notion that there is no need of one at that time, I dare affirm ſo many miſerable objects (as now daily occur to our obſervation) of all ages, could not be produced: and this aſſertion I found upon reaſon and experience: for when ſhould a man apply for relief of a diſtemper, but when he has it upon him? This fault or error muſt have ariſen from the miſapprehenſion of the nature of the diſtemper, and accidents from bad advice. But men ſhould conſider that this diſtemper is a criſis or effort of nature, to get rid of what the blood is overcharged with, (for reaſons already given) ſince the natural excretions were not ſufficient for that purpoſe to diſcharge the cauſe; and that the true way, conſequently, is to follow the dictates of nature, in giving ſuch things, without diſturbing her, or to help her, in promoting the work ſhe has begun, which is diſcover'd by the diſtemper. This is certainly the method in all other caſes; and there can be given no ſolid reaſon againſt it in this.

THE method, then, is, to adminiſter ſuch medicines as will promote the excretions of the gouty matter properly, in ſuch a manner as not to tranſlate or fix it, when there is a true fit; but to leſſen the quantity, and prevent the growth of more matter, particularly at ſuch a time when the juices are in a condition to precipitate or disjoin it, as happens during the fit.

THE doctrine of attraction before-mentioned explains that ſtate of Fluids, which occaſions a fit of the Gout, or prevents it; yet conſidering all the animal powers neceſſary to carry on the ſecretions and excretions, for health, I muſt beg leave to be more plain and particular on that condition of juices, when the fit comes. And this criſis happens at thoſe times, when the ſerum of the blood is ſo much impregnated with gouty matter, (which it has received or waſhed off from the red blood) that the particles of the matter, exceeding in their attractions of one another, and cannot be kept aſunder by the powers of circulation then exiſting in thoſe parts, muſt cohere, and, as it were, precipitate, cauſing a fit: for if the ſerum were not ſo much impregnated, the reſiſtance ariſing from coheſion of the particles of the fluid, exceeding the ſpecifick gravity of the particles of the gouty matter, will prevent their ſettling or precipitating, and there will be no fit of courſe: for a precipitation is occaſioned by a ſubſiding of particles, that float and are ſuſpended in a fluid, and will be, or not be conform to the reſiſtances of their coheſions, and the differences of their ſurfaces mutually. But this is commonly underſtood of a fluid at reſt; as we ſee by the ſettlement of urine, when cold; yet notwithſtanding, in the circulation there is motion, and thence heat, neceſſary to thin and leſſen the coheſion of particles, for the due performance of particular ſecretions, as well as excretions; and that motion being equal, but more languid in particular parts, ſuch as the hands and feet, or elſewhere in the ſmaller veſſels, cannot preſerve the mixture without ſuffering the groſſer or heavier particles to ſeparate, ſubſide, or precipitate: for if the coheſions are leſſened, and the moles increaſed before they arrive at the excretory paſſages to be waſhed off, they muſt ſtop in their way, forming obſtructions, pain, tumor, petrifactions, and all the gouty ſymptoms. A ſmall particle of matter adhering to the ſides of any tube, will inſenſibly grow bigger in the courſe of a moving fluid, and in time will obſtruct the tube, if it is not waſhed away; ſo in animal tubes the ſame will happen, if the impulſe is not ſufficient to rub it off, and protrude the particle; hence all petrifactions ariſe in the human body.

FROM all which it is plain, that a conſtitution whoſe fluids are full of gouty ſalts and matter, and cannot diſcharge them by the excretions, (from the reaſons aſſigned) muſt ſuffer in the diſtemper; and where-ever the circulation is moſt languid, there the gouty matter is more at freedom to ſettle; that ſmallneſs of particles well diluted, is what will carry them through the ſmall veſſels, till they are excreted; that too great heat and viſcidity will prevent the matter from being ſent out of the body; and the juices being in that condition, will occaſion vagrant and ſhooting pains, and inflammatory diſorders: that the true Gout is a critical diſcharge or ſeparation from the fluids, in the ſmall ſerous veſſels of the points of ſalts, and chalky particles, which could not cohere long enough in the fluids, till they were excreted; and alſo that the organs of ſecretion and excretion may be faulty in their performances, and create a gouty Plethora: that irregularities in our eating and drinking, either in quantities or qualities, will bring on ſuch a ſtate of blood as breeds the Gout: that a ſedentary and lazy life will do the ſame; in fine, that conſtitution of body, where the ſecretions and excretions are imperfect, let him live any how in point of regularity and exerciſe, muſt have a tendency to the Gout: and the contrary conſtitution, where there are ſtrong parts, and due natural excretions, will upon every occaſion get rid of the load, either by urine, purging, perſpiration, or other diſcharges, being increaſed as nature requires; let him eat, and drink, or live as he deſires, he will never have the Gout, ſo long as the organs of excretions are able to perform their offices duly and naturally; being in this ſtate, they are always ready to relieve the body from every incumbent load, and which our bodies are ſo liable to from the viciſſitudes of human life.

It is undeniable, that all the juices of the body partake of the nature of our aliment, tho' they are variouſly altered in the compoſition of the different fluids which exiſt in a healthy perſon. We cannot diſcover an acid, nor an alkali, truly ſpeaking, in any of them, while they circulate in the veſſels; neither do I ſuppoſe ſuch qualities can poſſibly be (beyond the *primæ viæ*) diſcovered; but that there may be a diſpoſition more to one than another in animal juices, when in a ſtate of reſt, or near to it, is very evident; there is no altering of the muriatick ſalt; where-ever it is in the animal juices, it will always diſcover itſelf in them at all times to the taſte, excepting in the *ſuccus nervoſus*; (and certainly it is there alſo, tho' not diſcernible; for nature does order it thus, that as ſea ſalt is the greateſt reſiſter of putrefaction, our juices might be leſs liable to it, in caſe of accidents in life, to occaſion it; therefore the muriatick or ſea ſalt never alters its nature, let it be modified never ſo by the ſecretions and diſſolutions of the animal body, it will always be the ſame: and likewiſe acid and alkaline juices are never to be found diſtinctly beyond the *primæ viæ*, while they are in motion; but in a ſtate of ſtagnation they may diſcover ſuch qualities, as they are more or leſs of an acaſcent or alkaleſcent nature; and painful tumors and putrefaction will inſue, conformable to the nature of the acrimony, and the ſeat of the obſtruction, whether in the blood-veſſel or *Serum.*

PUTREFACTION proceeds from alkalious juices, and acid or briny juices reſiſt it; but as ſea ſalt continues the ſame unaltered; and where they abound, as in ſea-ſcurvies, *&c.* they will burſt the capillary veſſels, and cauſe eroſions, puſtles, the chymoſis, *&c.* We can only reaſon analogically on thoſe qualities of acid and alkali being within the animal; for one can never experiment it in them, to make a plain diſcovery, as is perceived from the conjunctions of an acid and alkali together, where a plain fermentation and ebullition immediately ariſes: For as Phyſicians know that all acid medicines thicken the juices, and create a more languid circulation than what ought to be in a healthy ſtate, ſo they diſpoſe the fluids to put on an acid acrimony; and as all alkalious medicines thin the juices, and accelerate their motions above the ſtandard of health; on the contrary, diſpoſe the fluids to put on an alkaline acrimony. But this way of reaſoning, altho' ſometimes it may be of uſe, yet it comes very ſhort of what is neceſſary in phyſical explanations, with regard to the animal oeconomy, in point of truth, and right information: So, whether the gout is owing to an acid or alkali, is of no moment (were we certain) towards finding out the method of cure. Therefore, from what is ſaid before, and being founded upon the doctrine of attraction, concerning the ſtate of the fluids in a gouty conſtitution, and thence ariſes a ſtiff or a lax fibre, will afford greater information and certainty than any reaſoning upon other principles can do. And as the fibres which are endowed with elaſticity, may be more or leſs ſo in a morbifick ſtate, and conſequently may hurt the ſecretions and excretions thereby; I conſider a lax and ſtiff fibre only as the effect of different diſorders in the fluids; and ſince every phyſician's curative intention cannot be eſtabliſhed on any other footing than rectifying the juices, which will certainly remove thoſe faults in the animal oeconomy that caus'd the diſtemper (if curable); what uſe then is there of ſo much ſpeculation concerning a lax and a ſtiff fibre, when medicines can only affect the fibres, as the juices are altered or made better? My ſaying the fibres are lax, and they muſt be braced, can mean no more than, I muſt uſe ſuch methods in medicine as to alter the juices in ſuch manner, as will have the effects of making the perſon ſtrong, and of taking off the cauſe that prevented the fibres from performing their offices, by their natural intrinſick elaſticity: for nothing under a ſolution of continuity can deſtroy that intrinſick property of a fibre, but an error in the fluids will ſuſpend it, or relax it; and when that cauſe is removed, the fibre will return to act in its natural ſtate. The conſequence or effect of a firſt cauſe is too often taken for the diſtemper, and very frequently occaſions miſtakes in practice, and the prevention of cures that might be made. The Gout, for inſtance, brings upon a perſon all the ſymptoms of relaxation; therefore the general opinion is againſt warm bathing; but conſidering that this ſtate of relaxation is only a ſuſpenſion (as now ſaid) occaſion'd by viſcid inactive juices, furring and ſticking to the ſides of the fibres, preventing their intrinſick powers of contraction from acting; we ſhall find that Bathing in warm water is abſolutely neceſſary for a cure, ſince by its heat and dilution it will moſt readily carry off the cauſe, by thinning and diſſolving thoſe coheſions, which will accelerate the circulations, and promote all the animal ſecretions and excretions, whereby the fibres return to their natural tone, and health is reſtored. Paralytick diſorders diſcover all the ſigns of relaxation; yet the ſucceſs attending ſuch caſes by bathing in the hot ſprings of *Bath*, proves what I have ſaid to be true in fact; and where Bathing has been tried in gouty caſes, and under proper directions, as I have experienced, it proved alike ſucceſsful. Many other caſes that fall under the doctrine of a lax fibre, and from which bathing in the hot Baths has been thought dangerous, may be cured by ſuch means: numbers of common people find great relief and ſhort fits in the gout from bathing, and even during the fit: but as I would not be underſtood literally, that, without doing any thing elſe, bathing will anſwer; (for I am very ſenſible, a great deal of miſchief has followed bathing improperly; and poſſibly ſuch accidents have put it under diſcredit of late years) therefore, as there is ſuch a diſſimilitude of conſtitutions, and conſequently in one and the ſame diſtemper, what may cure one, may deſtroy another; for which reaſon no perſon ought to fall in with a general hint given, and follow ſuch a method, without the advice of an able and experienced phyſician, who can direct him in the proper way, for preparing his body before he makes the eſſay in bathing; and alſo during the time while he is under that method, ſuch ſymptoms may ariſe and commonly do, as require the ſkilful hand to ſet to-rights; and when they do happen, it is often the reaſon given for leaving off, and conſequently preventing a cure; whereas a due attention to the ſymptoms or complaints that may ariſe during a courſe of bathing, indicate the uſe of ſuch remedies, as may perfect a cure, if ſteadily proſecuted. It is very certain, there are a great many prejudiced againſt Bathing, which upon enquiry is founded upon accounts that are not to be regarded; or from accidents that happen by miſmanagement and bathing improperly: for as there may be danger, even from the moſt ſalubrious means, without due care and attention of the phyſician, in moſt caſes, particularly in the Gout, it is neceſſary to give the following Obſervations.

Firſt; As bathing will certainly open and widen all the capillary veſſels and outlets, and thereby the pent up gouty matter, that either cohered to the ſides of the veſſels and ducts, or totally obſtructed them, (if not petrified) will be looſened and diſſolved; part of which not being carried off by ſweating and perſpiration in bathing, but mixing with the juices of the body, may be tranſlated, and if not evacuated by proper ways, may produce bad diſorders by ſubſiding and fixing upon ſome of the viſcera, or occaſion, if not disjoined from the blood, a fever of a bad kind, and what I call, a gouty fever.

Secondly; That no perſon of a gouty conſtitution, whoſe viſcera are weak and unſound, the ſymptoms and appearances ſuggeſting reaſons of ſuſpicion they are in that condition, ought ever to bathe; and alſo thoſe who have laboured under much gout, and are above fifty years old, ſhould be well adviſed, before ever they make the attempt; for this reaſon, becauſe their bodily powers are much impaired by the diſtemper, and in that ſtage of life the tone of fibres cannot be ſo eaſily reſtored (if at all) to perform their offices by the aſſiſtance of medicine, in caſe any accident happen from bathing, as I have mentioned; for youth and natural vigour will cooperate and bear the aſſiſtance of medicine towards a recovery, which, when gone, the body will ſink, and be apt to flag under the neceſſary operations of it to have any effect.

Thirdly; All thoſe who have impaired their conſtitutions by living too low, as in a milk and vegetable diet, run a great risk by bathing in the hot ſprings: for a perſeverance in that diet does ſo weaken all the animal powers, and induces an alkaleſcent ſtate of fluids, which occaſions ſuch a relaxation and putrid ſoftneſs in all the ſolid frame, that they can bear no effort or violence of any kind without bad conſequences. This, as it explains the true reaſon for the danger of returning to a more free diet afterwards; ſo it alſo affords a reaſon why any external impulſe which happens from bathing, will be attended with danger to a perſon, in ſuch a ſtate of fluids and ſolids as a vegetable diet produceth. I might mention other caſes where bathing is not proper; but what I ſaid may ſuffice; ſince no one ought to bathe without proper advice, and ſaying more might perhaps induce ſome to attempt it raſhly of their own accord, by which fatal accidents may happen, and thence may ariſe a diſlike of a moſt ſalubrious practice; for the unjudicious, right or wrong, are apt to blame or applaud the laſt remedy or means uſed.

Now, when a gouty perſon bathes in the hot baths, and is in a courſe of it, he ought to take ſuch alterative and deobſtruent medicines, in ſuch a direction, as will contribute in a proper way to the evacuation of the gouty matter which is disjoined, and ſet in motion; and in ſuch a manner as he can beſt indure, or his condition of body will allow of: for as all gout is owing to exceſſes, and a defect of the animal excretions, by which the matter would be diſcharged, were they not in fault; ſo of conſequence, from what has been ſaid, the method of cure is obvious of ſuch as are curable, and the mineral ſulphurs are the medicines which do moſt ſervice in ſuch caſes, duly combined with other medicines, as the intention of the phyſician directs, or he ſees moſt ſuitable to the caſe, by making them more purgative, diuretick, and diaphoretick, *&c.* Such a method will certainly diſlodge the gouty matter, and reſtore the gouty perſon to health, if the caſe is favourable, and in ſo far may be termed a cure, as well as the recovery from any other diſtemper is called ſo: ſor tho' there are ſome ſtages of this diſtemper incurable, yet there are others that may be ſaid to receive a cure, as the ſymptoms are mitigated, the fit ſhortened and cured, and the frequent relapſes prevented: The inevitable accidents to which human life is liable, put it out of the power of remedies to go further than curing for a time in moſt diſtempers; ſo it is in ſome ſtages of the gout. Then, conform to the vulgar opinion, that there is no cure for the gout, can only turn upon the *Latin* verſe,

Tollere nodoſam neſcit medicina podagram.

END *of the* Diſſertation *on the* GOUT.

A
DISSERTATION
ON
DIGESTION,
AND THE
Diſeaſes *of the* STOMACH *and* INTESTINES.

FROM the Stomach every creature receives a moſt ſenſible pleaſure, or a moſt exquiſite pain and uneaſineſs; from eating and drinking what is proper, in the firſt caſe; or from hunger, load of humours, and prejudicial things taken, in the ſecond caſe: And ſince the office of the ſtomach is firſt concerned in the preſervation and ſupport of the animal body, by digeſting the aliment, provident nature ſaw it neceſſary that it ſhould be endowed with ſuch a diſtinguiſhing ſenſation, to be pleaſed or offended, as it were, with what might be conducive to the well or evil being of the animal. For what tends to health, the ſtomach receives agreeably, and digeſts it; but the contrary cauſes ſickneſs and pain, with vomitings, in order to get rid of it.

IT is matter of no ſmall ſurprize to ſome, that the ſtomach, conſidering the ſtructure, as it is compoſed of membranes only, ſhould continue unworn out ſo long as the ſtandard of life, notwithſtanding the loads of ſolid and fluid aliment daily received, and its continual action upon thoſe, ſufficient (as one would think) to deſtroy or wear out what was much ſtronger, in a much ſhorter time: but as this ſurprize perhaps may ariſe from a notion that digeſtion is performed altogether by the muſcular force of the ſtomach, or trituration; yet the contrary appearing in the ſequel, will be more ſatisfactory, and better underſtood.

THOSE that advance Trituration for the only cauſe of digeſtion, demonſtrate the abſolute power of the ſtomach to be equal to the preſſure of 117,088 pound weight; to which if they add the powers of the diaphragm, and muſcles of the abdomen, which are conducive likewiſe to digeſtion, then the ſum will amount to 250,734 pound weight: ſuch calculations, however curious, do not convince, nor do they make the point clearer than the doctrine of particular ferments did, which the mechaniſts thereby intended to explode; but as there was no want of a power exceeding a mill-ſtone to grind, nor particular menſtruums and ferments to diſſolve in the performance of digeſtion, if they had conſider'd the power of water and heat upon ſolid alimentary things, with a little agitation, and the expanſion or rarefaction of the air contained in the aliment, they might have very naturally accounted for digeſtion, and from thence have given a moſt rational explanation, as it is now generally received. By the periſtaltick motion of the ſtomach, the aliment is moved and agitated, which mixes and combines the different diſſolved parts of it into a crude fluid, before it is expelled into the inteſtines; where mixing with the gall and pancreatick juice, it undergoes a ſecond and finer digeſtion, before it can enter the Lacteals: ſo far is muſcular motion concerned in digeſtion, and ſo much was neceſſary to complete it. The famous Mr. *Boyle*'s invention ſhews, that fleſh and bones, with a little water, are turn'd into a jelly, by the compreſſion of rarefied air confined in the digeſter; which operation proceeds from the heat expanding the air contained in the pores of the fleſh and bones: ſo maſtication, the ſaliva, the juices ſecerned in the gullet and ſtomach, with the liquids we drink, and the artificial or innate heat of things, together with the warmth of the ſtomach expanding the air, is ſufficient to deſtroy the coheſions of all the little particles of aliment; and the motion does blend and intimally mix thoſe together, which perfects the digeſtion of the ſtomach.

THE ſituation of the ſtomach is very warm, lying immediately under the midriff, and ſurrounded with the ſhort ribs; the liver covers part of its right ſide, and the ſpleen touches its left: the gut *colon* lies under its bottom, and the *omentum* or cawl being fixt to it, from right to left, hangs over it, with the *Aorta* and *vena cava* behind it. This warm ſituation indicates, that nature deſigned ſuch a heat as is neceſſary for digeſtion, to be always ſubſiſting and at hand, conſidering how liable the ſtomach is to be chilled by the free ingreſs of external air, and cold things taken down.

THE Structure is framed of four diſtinct membranes or coats; the villous being the inner one, is compoſed of ſhort fibres, ſtanding perpendicular upon the next coat, which is intirely nervous, as appears from the *papillæ* diſcover'd by *Ruyſch*; the third is muſcular, compos'd of ſtrait and circular fibres; the fourth ariſes from the *peritonæum*, and all the blood-veſſels lie immediately under it. The Nerves are ſupplied by the *par vagum*, or the eighth pair of Nerves. This general deſcription of the ſituation and ſtructure of the ſtomach will ſerve to clear up the following part of this Diſcourſe; a more particular one may be found in Treatiſes of Anatomy. I ſhall only add that the inmoſt coat is much larger than the reſt, being full of plaits and wrinkles, and full of glands, continually diſcharging themſelves into the cavity; and there is a conſiderable *plexus* of nerves in the upper orifice, with many other ramifications, which gives it that exquiſite ſenſe every one feels upon taking diſagreeable and hurtful things.

SELF-preſervation is implanted in every living creature; and it is from this principle that all our care and induſtry cometh at firſt for the ſupport of a pleaſant life, without the pain of hunger, or want of things neceſſary for our well-being: Starving is a moſt painful death, and a very hungry man can think of nothing ſo much at the time, as ſatisfying his hunger; and if it exceed, all the other paſſions and enjoyments are ſuſpended in the purſuit after food. Thus the deſire of food and nouriſhment may be accounted the firſt paſſion, exemplified in the new-born naturally, and excited by the love of life in thoſe more advanced in years, and the hatred every one has to that which gives uneaſineſs or pain, and what may tend to a diſſolution in the end: all this proves what an immediate communication there is between the ſtomach and *ſenſorium*; how neceſſary it is for health that this bowel ſhould be in good order, and what diſtreſſes upon the conſtitution in general diſtempers of the ſtomach muſt bring: and in fine, as it has the firſt office for the ſupport of the animal body, it is concluſive that it will ſhare in all caſes that tend to the deſtruction of it.

ALL the paſſions of the mind affect the ſtomach: Anger will in ſome excite vomiting, and grief will totally deſtroy the appetite; ſurprizes of all kinds will affect the ſtomach differently, as the conſtitution is; in ſome one way, in others another: Theſe are obſervations, not more eaſily to be accounted for than the other affections of the ſoul upon the body; but ſince they ſerve to prove, that as the mind affects the ſtomach, ſo the diſorders and cravings of the ſtomach affect the mind mutually; by which we may conceive an uninterrupted intercourſe and harmony betwixt the brain and the ſtomach, in a ſtate of health, as well as the contrary, in a ſtate of ſickneſs: and alſo we may learn from thence, that the true ſeat of all hypochondriack and hyſteric diſorders is in the ſtomach and *Primæ Viæ*; ſince no bowel or any other part of the body affected does produce ſymptoms any ways like to thoſe of vapouriſh people, in whom we find the mind ſuffers always as well as the ſtomach.

HUNGER is a ſenſation proceeding from an empty ſtomach, or ſome aſtringent acid humor bracing and hardening the *Villi* of the inner coat, whoſe ſtiffneſs, with the motion of the ſtomach, ſtimulate the nervous *papillæ* immediately under them, into that feeling which we call hunger. Now fulneſs or want of an appetite proceeds from a load of food, or viſcid ponderous humours, bearing down, ſoaking and relaxing thoſe *Villi*, by which the oppoſite ſenſation upon the *papillæ* is conveyed to the brain, and that impreſſion continues upon the *ſenſorium*, until the load or weight is removed either by digeſtion or vomiting.

HUMOURS of different qualities may be formed and compoſed in the ſtomach, and thoſe are in conformity to what we eat and drink, and the mixture of the ſaliva and juices of the ſtomach, from whence acrimony of all ſorts may ariſe, conform to the nature of all theſe joined together, and the degrees of heat in the bowel itſelf. They may be hot, acrid, ſharp, ſaline, thin, oily, cold, viſcid and ponderous, and each of them may partake of an acid and alkalious nature, as it happens: the irritations of the ſtomach, and its quiet, depend upon the different combinations of thoſe qualities; and as the exceſſes are in either of them, ſo are the ſenſations and effects producing a greater or leſſer degree of diſtemper or diſorder.

THE Saliva and Juices ſecreted into the ſtomach by the terminations of veſſels in the *tunica villoſa*, and the nervous *papillæ*, (as I have demonſtrated in the foregoing Treatiſe) ariſing from the mother fluid the blood, muſt of courſe be charged with whatever morbific quality it partakes of. Hence diſorders or errors in the blood, and *ſuccus nervoſus*, muſt affect the ſtomach and guts, according to the qualities and quantities of ſuch juices ſecreted in them. Hence no diſtemper can happen from an evil ſtate of blood, but the ſtomach muſt in ſome meaſure ſhare or be affected with it. Thus we ſee in Fevers of all ſorts, the ſtomach is ſick, throws up, or hurries down, as in diarrheas or looſneſſes; it loaths meat, is in pain, hot, cauſing a great thirſt, can digeſt or keep nothing but liquids: ſo it happens in the beginning of all fevers, and moſt remarkably in intermittents; thoſe ſymptoms ceaſing when the ſweat comes on, which puts an end to the fit, and the perſon enjoys health, until the period is come of a freſh ſupply being accumulated of febrile matter, capable of ſtirring up the like tumults. When the caſe is acute, the criſis puts an end to all thoſe ſtomachick ſymptoms, eſpecially if the evacuation falls upon the skin, as by ſweating, eruption of the ſmall pox, meaſles, raſh, or any miliary diſorder. There is ſuch a continual diſcharge into the ſtomach of ſaliva, lymph, and nervous juice, for the purpoſes of digeſtion, that it is no wonder it is and muſt be affected in all caſes proceeding from an ill ſtate of blood. But ſuch caſes are purely and properly ſymptomatical, and can't be numbered with the real diſtempers of the ſtomach or bowel itſelf; and without the proper diſtinctions between the real and ſymptomatical diſorders be made, a man muſt blunder exceedingly in the courſe of practice.

THAT this may appear more plain, it is neceſſary to make a recital of thoſe diſtempers which are ſaid to be the real ones of the ſtomach, and then the diſtinctions and differences may appear. 1. A want of appetite, and a diſlike of meat; 2. A canine appetite; 3. A depraved appetite, and a deſire of eating hurtful things; 4. A morbifick thirſt; 5. Indigeſtion; 6. Hiccough, or *Singultus*; 7. An inclination to vomit, and vomiting; 8. A vomiting of blood; 9. A *cholera morbus*; 10. A pain of the ſtomach; 11. An inflammation, abſceſs and ulcer of the ſtomach. The firſt of theſe may be either real or ſymptomatical;

for a want of appetite is occaſioned by a *ſaburra* of humours, for want of a proper action to expel them, and a relaxation of the ſecretory paſſages, by which a load is formed, growing viſcid, and clinging faſt to the *villi*, which keeps them depreſſed, ſoft and relaxed, thereby creating a ſenſation of fulneſs, and a diſlike to meat, all the ſame as if the ſtomach was filled with a plentiful meal: But the ſame may happen ſymptomatically from a fever, ſcorbutick blood, an overflowing of the gall, a bad ſecretion, or obſtructions of the liver, fluxes of all kinds, and all diſtempers accompanied with pain; which by conſent or ſympathy affects the nervous *papillæ* and ſecretion in the ſtomach; a free perſpiration gives an appetite, and when 'tis otherwiſe, the appetite ſuffers.

THE Second caſe is directly oppoſite; for a voracious canine appetite proceeds from humors of a more active nature bred in the ſtomach, either acid, auſtere, ſaline, or ſpirituous, which bracing and hardning the *villi*, irritate the nerves and coats of the ſtomach into too frequent and ſtrong vibrations; and thereby removing too ſpeedily, and ſo preventing its being ſenſible of the load that is greedily thrown down, a continual *ſtimulus* of hunger is excited: This may be ſymptomatical from worms, or a ſaline briny blood; as in hot ſcurveys.

THE Third being a depraved appetite or *pica*, that is, a deſire of eating extraordinary things that are not nutritive, but hurtful; this is peculiar to children, eſpecially the Girls, and arrives from an acrid hot humor, and is a real diſtemper of the ſtomach; but may be ſymptomatical from the *fluor albus*, and obſtructions of the *menſes*: The particular longings of child-bearing women, and the conſequences, if not ſatisfied, ſhew the conſent there is betwixt the womb and the ſtomach, but cannot eaſily be explained.

THE Fourth being Thirſt, may be a true ſtomach diſtemper, for want of a due ſecretion of juices in it; whereby an unnatural heat and dryneſs is occaſioned from the obſtruction; but this may alſo ariſe from a too great waſte of the animal juices, in evacuations of all ſorts, the eating of ſalt, pungent, hot things, and a hot ſtate of blood, as in fevers and inflammatory caſes: a phlegmatick perſon is never thirſty, but when he is hot and inflamed,

flamed, which thickens the phlegm, and obſtructs the diſcharge of it.

THE Fifth diſtemper is indigeſtion; and that may ariſe from many cauſes, *viz.* from all the powers of digeſtion being in fault; from a bad formation; from the villous coat being worn out; from particular things that we eat and drink; from too great abſtinence as well as indulgence, hard drinking, eſpecially of ſpirits, all exceſſes of the paſſions, ſcirrous ſwellings in the *tunica villoſa*; and in fine, all the cauſes of the firſt, ſecond, third and fourth caſe mentioned.

THE Sixth diſtemper is a *ſingultus* or hiccough, and proceeds from an irritation of the nerves of the ſtomach cauſing a ſudden ſpaſm in the upper orifice, and communicating it to the diaphragm, the ſtomach, as it were, riſes up (the contracting of the diaphragm giving it more ſpace) to throw out; but a ſtop is made by the contraction of the upper orifice, which finiſhes the convulſive motion. An overcharge from ſpirituous liquor, and a ſudden draught of cold, fermentative or briſk liquor, will cauſe this irritation; flatulency and worms will occaſion the ſame; in ſuch caſes there is no danger, and the cure is eaſy; but where it becomes a ſymptom, as in fevers, *&c.* it is far otherwiſe, and often mortal. I ſaved a man's life in the 15th day of his fever, with a continual *ſingultus*, by giving him a vomit. I was called to another, who without a fever, or any viſible or ſenſible cauſe, was taken with a continual hiccough, which not yielding to all things tried, killed him in four days.

THE Seventh caſe is a *nauſea* and vomiting, which differ only in *magis* and *minus*; for both are a *ſtimulus* or expulſion upwards, in oppoſition to the natural one, towards the *pylorus* and inteſtines, and the contraction begins in the lower part of the ſtomach; the upper orifice being relaxed and open, gives way to the *impetus*, and the perſon reaches and vomits. This may be either artificial, as in the adminiſtration of medicines and poiſons; or natural, as in the caſe of an overflowing of juices, and indigeſtion, where by their ſtay, and heat of the ſtomach, they acquire qualities that will incite reachings and vomitings; or ſymptomatical, as proceeding from a bad ſtate of juices in the habit, fevers, gout, plethora of the blood-veſſels of the ſtomach, as in breeding and obſtructed women, cholicks of all ſorts, contuſion and concuſſion of the brain, paſſions of the mind; and in fine, all things that are diſagreeable to our ſenſes; which is a certain proof, that whatever offends the *genus nervoſum*, muſt by conſent affect the nerves of the ſtomach, and alſo whatever fault there is in the office of the ſtomach, the nervous *papilla* being affected, the *ſenſorium* muſt be affected alſo, as was before hinted. Sea-ſickneſs, or vomiting from any other unuſual motion happening, is only to be accounted for from the conſent of the nerves with the brain.

THE Eighth is, a vomiting of blood, which may proceed from a ruptured veſſel, or a diſſolved thin blood voided by the ducts that before only ſecreted a limpid juice; and theſe are occaſioned from various cauſes, both from without and within the animal; as blows and wounds; a *plethora*, as in womens caſes from obſtructions, and a ſtoppage of critical evacuations; as in the hemorrhoids, violent exerciſe and ſtrains in riding, poiſons, colliquations, and violent vomitings.

THE Ninth caſe is a moſt violent irritation, ſo as to cauſe exceſſive vomiting and purging, with pain and inflammation, cauſing intolerable thirſt: This proceeds from a moſt acrid, cauſtick humour, the effect of indigeſtion, poiſons, or a ſcorbutick habit of body, the morbifick juices all flowing into the ſtomach and guts, conſtantly ſtimulating a diſcharge upwards and downwards, until there are no juices left to carry on the circulation, and death enſues.

THE Tenth caſe, which is pain in the ſtomach, and may ariſe from all the foregoing cauſes; but ſtrictly, as a chronick diſeaſe, proceeds from flatulency, and a viſcid fermentative humour, pulling and tearing, as it were, the villous coat, to which it adheres almoſt immoveably, and glutinous as the white of an egg, cauſing an uneaſy, heavy pain, with lowneſs and inactivity. *Caſe* 1. and 3.

THE Eleventh being an inflammation, may be a conſequence of one or other of the foregoing caſes; and an abſceſs and ulcer is the conſequence of an inflammation, if it is not carried off. This proceeds alſo from an inflamed ſizy blood, and is attended with a moſt ardent violent fever, exceſſive burning thirſt, and moſt exquiſite pain, and few recover of it. An ulcer may be cauſed without an abſceſs, from an excoriation of the humours, as ſharp bile, *&c.* and poiſons, as arſenic, corroſive ſublimate, cantharides, *&c.*

Now having ſhewn the differences betwixt the real diſtempers, and what are properly ſymptomatical, when they affect the ſtomach, it appears from thence, that external cauſes, and an unhealthy diſpoſition of blood and nervous juice, are more frequently productive of diſorders, than what ariſe from the ſtomach itſelf. And that the real diſtempers of it only ariſe from an hereditary debility in formation, an obſtruction of the ſecretory paſſages into the ſtomach, and their being too open and relaxed, and alſo the villous coat being abraded, or worn out, and made ſmooth; but as the ſtomach cannot be long in this condition without the blood and other juices of the body altering, the effects will be ſoon felt in the ſtomach from ſuch an alteration; and then the caſe becomes complicated into a real and ſymptomatical one, from the effects of crudities, or bad digeſtion and foul blood.

FLATULENCY or wind in the ſtomach and guts is a moſt general complaint, and when ſpirituous and hot, occaſions ſpaſms, which prevent its diſcharge either upwards or downwards, cauſing pain, diſtention, and great oppreſſions; but when the ſtomach and bowels are clean, and the wind is not hot, and proceeds from only pure rarefied air, it will paſs off with little uneaſineſs. A warm quick digeſtion, and conſequently ſtrong, will find leſs inconveniencies in this reſpect from the ſtrong meats, as of animals full grown, than from thoſe that are more tender; and all cold food diſagrees exceedingly with ſuch, from the condenſation of the air, which is in great plenty in all ſuch food, fruits, roots, and plants; which, admitting of a greater degree of rarefaction in ſuch conſtitutions, will diſtend the bowels violently, and create colick, and great diſorders.

EVERY body is ſubject to flatulency, more or leſs, according to what they eat or drink, which is more or leſs full of air, or ſubject to ferment, from the neceſſary powers of digeſtion; but in a ſtate of health it is our own fault, if we don't ſhun or refuſe thoſe things that are moſt liable to cauſe it: There is no complaint ſo general as that of wind and flatulency, and none more ſubject to it than thoſe who have not a regular and free perſpiration, becauſe the ſuperfluity and vapour that ought to paſs off in perſpiration, recoils upon the ſtomach and guts, and all the ſecretory outlets appointed for their offices, which being the moſt ready receptacles of any, when open, are continually ſecreting their juices in a ſtate of health. This redundancy of humor cauſes ferment and vapor, and a weighty load upon the ſtomach, with a ſenſation of fulneſs and inappetency, from the depreſſion of the *villi* and viſcidity the matter acquires, if it is not diſcharged by purging, and other evacuations; the humour may alſo acquire a degree of Acrimony, which will ſtimulate the nervous *papillæ* into ſpaſmodic motions, and from what was ſaid, will affect the *genus nervoſum.* This is the true character of hypochondriac and hyſteric diſorders; and as the inclemency and inconſtancy of our weather in *Britain* muſt greatly affect our bodies, and hurt perſpiration, it is no wonder that we are more ſubject to thoſe diſtempers than our neighbour nations lying more to the ſouthward: Luxury, intemperance, turning night into day, as it were; idleneſs and inactivity, will have the like effects on the perſpiration, and digeſtive powers. Theſe, of late years, are too much practiſed amongſt us, which occaſions the frequency of nervous diſtempers; whereas the reverſe ought to be obſerved, to obviate the injuries which may come upon us by the weather; and the way to that is, by exerciſe, and a regular life.

THE inteſtines beginning from the lower orifice of the ſtomach, muſt ſuffer in all diſorders thereof, and by conſent of parts, they cannot be out of order without affecting the ſtomach: thus, as chylification is begun in the ſtomach, it is carried on in the inteſtines, as far as to make the chyle fit to paſs the lacteals, by the aſſiſtance of the gall, and pancreatick juice, which mix with it in the firſt gut, immediately upon its coming out of the ſtomach, and very often the gall is pump'd into the ſtomach by ſome accidental motion, or by a different duct eating the *pylorus*, which ſometimes happens. Hence the diſtempers of the ſtomach and guts are nearly ſimilar, only the laſt are more ſubject to impreſſions from the faults of the bile, and juice of the pancreas, which are often the cauſe of cholicks, as well as bad digeſtion and ill-conditioned humours of the ſtomach. Theſe juices therefore, as proceeding from the ſame original with thoſe ſecreted into the ſtomach, *viz.* the blood, what has been ſaid concerning them, will account for the alterations of the bile and pancreatick juices alſo; and as the book on Aliment (by the worthy Doctor *Arbuthnot*) treats on that point, I ſhall dwell no longer on the ſubject; ſince from what is here and there laid down, is ſufficiently explanatory for any one ſkilled in the operations of medicines, and their effects, to find out remedies for cure in all ſuch curable caſes; and alſo to ſhew how uſeful and efficacious the drinking *Bath* waters, with bathing in them, may be in all diſtempers of the *primæ viæ*, or ſtomach and bowels; which was hinted in the foregoing Eſſay.

Now from what has been ſaid, it is evident that Digeſtion is performed by heat, the expanſion of air, motion, and fluids; and thoſe fluids are the Saliva, all the juices ſecreted in the ſtomach, the bile and pancreatick juice, with what we eat and drink; and all theſe agreeing in due quantities and qualities without exceſs of any one, chylification is performed: thus the chyle, or all the nutritious juices, is fitted to paſs into the lacteals or milky veſſels, whence it flows into the blood, by the left ſubclavian vein, and incorporates with it for all the animal purpoſes and nutrition.

THAT the ſtomach is very conveniently ſituated for the preſervation of that heat, ſo neceſſary to be preſerved againſt all the accidents which may leſſen it, by what we take in voluntarily, and entrance of cold air which we cannot prevent:

THAT the ſtructure of the ſtomach is ſtrong, very ſenſible, able to bear the frictions and inteſtine motions of all we eat and drink with and without exceſſes, for the ſpace of many years:

THAT hunger will affect ſo ſtrongly, that to ſatisfy it we will forego all other pleaſures; as want of food tends to the deſtroying life more immediately, and ſelf-preſervation is innate, about which every animal ſeems moſt concerned:

THAT the Paſſions of the mind affect the ſtomach, and the diſorders of the ſtomach affect the mind mutually; which proves the ſeat of hypochondriacal and hyſterical diſorders:

THAT the ſenſation of hunger or fulneſs is conform to the relaxation and ſtiffneſs of the *villæ* moving upon the nervous *papillæ:*

THAT the various alterations and conditions of the juices in the ſtomach and guts are in conformity to what we eat and take in, or to the ſtate of the bowels, and juices of the body:

THAT towards curing and helping the diſorders of the ſtomach, it is abſolutely neceſſary to make a true diſtinction betwixt a real and ſymptomatical one; which is plainly and briefly ſet forth in Eleven Caſes: All which ſhew, that the various complaints of the ſtomach (if curable) may be aſſiſted by external applications, ſuch as are anodyne and warm, promoting the perſpiration of the parts that cover it; for tho' the ſtomach lies (as one may think) free and diſtinct from the external coverings of the abdomen; yet experience proving that vomitings may be excited by external means, ſuch as a poltice of Tobacco, *&c.* demonſtrates that proper applications externally may be of very great uſe in many complaints.

OUR bodies are nouriſhed conform to what we take into our ſtomachs, the digeſtion, and the excretions; all which acting agreeably to the laws of nature or animal oeconomy, preſerves the body in health, and good plight: on the contrary, as is ſhew'd before, with regard to the aliment and digeſtion, ſo a defect in the excretions by ſtool, or diſtempers of the inteſtines, do deſtroy or put a ſtop to thoſe natural good effects: As for inſtance, if coſtiveneſs exceeds, or various kinds of fluxes happen, colick, pains, ſpaſms and tendencies to inflammations, from pungent putrid humours, with what uneaſineſs and trouble is the perſon affected; and what waſte and deſtruction follows upon the body for want of nouriſhment!

TO treat of the diſtempers of the inteſtines very minutely and particularly, would require a longer deſcription than my intended brevity will permit me; as my purpoſe is only to give ſuch hints concerning them, to ſhew the uſefulneſs of drinking and bathing in the *Bath* waters, to thoſe that are afflicted with ſuch diſtempers. The Inteſtines, then, are compoſed of one long tube, beginning from the lower orifice of the ſtomach or *pylorus*, and ending in the *anus*, commonly ſix times as long as the body to which they belong, connected to the edge of a membrane called the Meſentery, in a manner very curious; the diameter of which does not exceed many inches: they are compoſed of three coats, as Anatomy diſcovers; the inmoſt is made up of ſhort fibres, bound or joined together by blood-veſſels of the fineſt order, and the length of thoſe fibres are as the thickneſs of the gut, plainly to be ſeen by injecting the meſenterick artery with warm water, which makes them divide from one another: This coat contracts the gut in the ſame manner as that of the ſtomach, and being much longer than the others, forms plaits, and an uneven ſurface, which are called *valvulæ conniventes*; in their upper edges are placed the orifices of the lacteal veſſels, that the chyle being retarded by theſe wrinkles or valves, it may the more readily enter them: there are numbers of glands diſcharging a liquor, which undoubtedly ſerve for a farther attenuation and dilution of the chyle, and preſerving the mouths of the lacteals patent and open; by lubrifying and waſhing off the ſolid particles of excrement, that may ſtick and obſtruct them in their way downwards, and thus forming alſo a regularity in going to ſtool. The ſecond coat is made up of two orders of muſcular fibres; the one running length-ways, and the other more ſpiral than circular, which performs the vermicular or periſtaltick motion, and expels the *fæces* or excrement, and wind: the third, according to Anatomiſts, comes from the membrane that lines all the inſide of the belly, and is named the *peritonæum:* The extraordinary ſenſibility of the inteſtines diſcovers them to be full of nervous expanſions, which are not diſcoverable by the naked eye. See *Ruyſch.*

ANATOMISTS, for diſtinction ſake, have divided this long Tube of the guts into ſix different ones, and thoſe into three ſmall, and three great: the ſmall are in their order from the ſtomach, the *Duodenum*, *Jejunum*, and *Ilion*; the other three great are the *Cæcum*, *Colon*, and *Rectum*. The firſt is pierced by the common gall duct from the liver, and the duct from the *Pancreas*, or ſweet-bread, which mix their juices with the digeſted food coming out of the ſtomach. It is remarkable, that the *valvulæ conniventes* deſcribe greater ſegments of a circle, and are nearer to one another in the ſmall guts, than they are in the great ones, where they are broader and at a greater diſtance from one another, only ſerving, as it were, to ſuſtain the weight of the *fæces*, and preventing their ſudden expulſion. The *Jejunum* has more lacteal veſſels than the *Ilium*, and is almoſt always found empty: this gut, by its circumvolutions from right to left, lies in the region above the navel; the *Ilium* poſſeſſes all below the navel, and is the production of ruptures, and the *volvulus* or iliack paſſion: from this immediately begins the *Cæcum*, which, like the finger of a glove, looks like an appendage to the *Colon* to which it is tied; it has no outlet, but what goes into it muſt return the ſame way. The *Colon* being the ſecond great gut, begins where the *Ilium* ends, and is the largeſt of all the inteſtines, which aſcending by the right kidney, paſſes under the lower concave part of the liver, often tinged yellow with gall, and tied thereto; then under the ſtomach, to the ſpleen on the left ſide, and left kidney, to both which it adheres, and ſo terminates at the upper part of the *Os ſacrum* in the *Rectum* or laſt gut. In the beginning of the *Colon*, upon account of its erect poſition, there is a very ſtrong Valve, to prevent the falling back of the excrement, and its ſtrength is particular with cells, which ſerve to ſupport the great load of excrement, that receives its firſt form there, and prevents its quick deſcent into the laſt gut. This ſituation ſhews of what great uſe clyſters are in diſtempers of the lower belly and inteſtines. The *Rectum* or ſtreight gut is next, and ends in the *Anus*; it is attached to the extremity of the *Os Coccyx* behind, and to the neck of the bladder in men before, and in women to the *Uterus* or Womb: it has three muſcles belonging to it, the *Sphincter* and the *levatores ani*; the one to ſhut it, and the other two to open it.

THE cauſes of diſorders in the guts are as other cauſes falling upon this or the other part of the body, when they proceed from a morbifick alteration of the humours; but as in the bowels, *viz.* the ſtomach and inteſtines, there may ariſe diſorders immediately from our aliment, and things taken in, without an error in the juices of our body, which are eaſily comprehended and found out; I ſhall only mention thoſe that proceed from faults in the bile and pancreatick juice, and a relaxation or ſtoppage in the inteſtine glands, with the conſequences of a hereditary bad ſtructure in them, as well as the acquired one from a bad conſtitution. The firſt then is the Colick pain; the 2d is Aſtrictions or Coſtiveneſs; 3d is a Diarrhæa; 4th a Dyſentery; 5th the Hepatick flux; 6th a Loentary; 7th the Iliack paſſion; 8th is an inordinate deſire of going to ſtool, or a *Teneſmus*; 9th Worms; 10th Hæmorrhoidal flux and pain.

1. THE Colick pain, upon conſidering the deſcription of the gut *Colon* before-mentioned, will appear to be a moſt common diſtemper, both from its length and valves; and alſo as it is the receiver of almoſt all the dreg or excrement, which by remaining too long there, often is the cauſe of pain. Hot and ſharp, or cold and viſcid humours, are the common cauſes of Colicks, wind proceeding from indigeſtion, which lays up in the inteſtines cauſes of fermentation, with the bile and pancreatick juices, and alſo with every thing we eat and drink, keeps the belly ever diſtended and blown up, unleſs it is expelled by the *Anus*, or Belching; but if by hard excrement the Colon is ſtuffed, and the wind cannot paſs, it will create pain in different

parts of the belly, as the direction of the gut, and where the ſtop is; conform to the pungency, volatility and acrimony of the humour; and this humour may be either an acid or an alkali, of an innocent nature; or a cauſtical one, either thin or viſcid: ſo as the humour is, the pain is more or leſs violent, either by diſtending, or, as it were, rending the part, if fixt; or if moveable, by excoriating and inflaming, thereby cauſing violent gripes or ſpaſms. Coſtiveneſs almoſt always attends this diſtemper, ſtrictly ſpeaking, otherwiſe it coincides with one of another name: when it is owing to hard excrement in the upper part of the Colon, the pain is fixt until that gives way: ſtones either bred in the guts, or ſwallowed down, balls of worms, *&c.* ſtopping, will have the ſame effect; but when it proceeds from humours, and is truly bilious, which is evident from the vomitings of a yellow, green and ruſty or iron colour, the pain will be more ſhifting and unſettled: ſometimes it may be miſtaken for a nephritick colick, the pain being fixt in the loin, from a diſtenſion of that part of the Colon that is generally attached to the left *Uterus*: but as a true bilious colick receives more relief from the vomitings, than it would do, was it a nephritick one, this obſervation may prevent the miſtake. There are ſeveral others, neceſſary for the diſtinction, ſuch as, the vomitings are more violent in a bilious colick, with ſurprizing diſcharges of bile; the pain is more fixt, and being in the Ureter, will extend itſelf to the *Teſtes* of that ſide; the appetite is more affected in the true colick, for eating makes it worſe, and has no bad effect in a nephritick one, and there is greater relief from vomitings and excretions than in the gravel colick; the urine is thick, high colour'd, a quick pulſe and great thirſt in a bilious one: but in the beginning of a nephritick colick the water is clear and thin; without any feveriſh ſymptom attending the perſon, but what may ariſe from its continuance.

ALL colicks, as they occaſion pain, affect the nerves of the inteſtines; but there is a colick truly nervous, proceeding from a fault in the *ſuccus nervoſus*, and obſtructions in the *papillæ nervoſæ* of the inteſtines: this is moſt violent, from the ſpaſms or convulſions that ariſe in the guts at times, and remits or continues from time to time variouſly, for years, wearing out the perſon, or ending in a palſy, either particular to ſome part, half palſy, or whole. The dry belly-ach of foreign countries is a kind of this, the men being only ſubject to it; for the women are more temperate than the men. There is alſo a colick peculiar to women, which is called hyſterick: this is nervous, and ariſes from a ſpaſm or cramp-like convulſion in the womb, which is to be felt often like a hard ball, in one ſide of the belly: this, by conſent of the nerves with the guts, cauſes pain in them, and colical ſymptoms: So from what is ſaid, and conform to the general acceptation of the word colick, which ſignifies every diſorder attended with pain in the bowels, they are divided by Phyſicians into bilious, flatulent, nervous, hyſterick, and nephritick; and the cure of them conſiſts in emollient Lenitives, Carminatives, the warm effluent Gum Medicines, and Diureticks, Phlebotomy and Opiates, as there is occaſion; and the tepid Bath is of the greateſt uſe: In fine, a regular courſe of drinking of the *Bath* waters, and proper bathing, will cure and prevent a relapſe, joined with exerciſe, and a right uſe of the non-naturals. But this method is only of uſe in thoſe chronical caſes where it it is not perpetual, conſtant, and owing its riſe to indigeſtion, and periodical influences of bad juices, from a Cachexia, or ill habit of body; for when it is violent without intermiſſion, quicker means muſt be uſed, and perhaps even then the perſon can only be reliev'd from his miſery by death; which may be prognoſticated from want of evacuation, reſtleſneſs, delirium, hiccough, cold ſweats, chilneſs in the limbs, and a regular pulſe; which laſt is a ſure ſign of the mortification being begun: Thoſe that eſcape in a ſevere bilious colick, often have the jaundice, gout, epilepſy, and palſy.

ASTRICTION, or a coſtive belly, is often the cauſe of colick pains, and proceeds from a hot ſtate of blood, the want of due ſecretion of the liver, and the inteſtinal glands, when people enjoy their health in this caſe; as I have known ſome in their common way have but one ſtool in eight days, others a fortnight, without any uneaſineſs; it is owing to a ſtrong, ſtiff ſtate of inteſtinal fibres, an indolent life, and a languid periſtaltick motion: but when it becomes a diſtemper, attended with great pain and compreſſion of veſſels, an inflammation comes on; and if not timely remedied, is of the greateſt danger. Phlebotomy and emollients, or gentle openers in clyſters and broths, are the ſucceſsful means.

INTESTINAL fluxes of all kinds have their different names aſcribed to them by the Ancients, according to the nature, colour and conſiſtence of the ſtools. Thus in a Lientery the aliment comes away by ſtool as it went into the ſtomach; in the cœliack paſſion it is crude and imperfectly digeſted: in a diarrhœa the flux appears only humoural: in a dyſentery the flux is bloody; and the hepatick flux is a great diſcharge of ſerous and bloody ſtools, like waſhings of fleſh: But as all fluxes may be more compendiouſly treated under the two names of Diarrhœa and Dyſentery; *viz.* thoſe that are without blood being a ſpecies of a Diarrhœa, and thoſe that are bloody being a ſpecies of a Dyſentery, I ſhall only mention them in that manner.

ALL kinds of Diarrhœas have their riſe, either immediately from what we take in, that is purgative or ſtimulating of the nervous *papillæ* of the inward and firſt coat of the inteſtines; and that cauſe may be either medicinal or accidental from our diet; but the many ſorts of Diarrhœas, as they are diſtempers, proceed from our juices being over-pregnated with ſtimulating ſalts, which fall, or are determined more upon the inteſtines than other parts; and in ſuch a ſtate of fluidity as to flow by the inteſtinal glands into their cavities, cauſing a Diarrhœa with different ſymptoms, as the component parts of the juices are of different conſtitutions: for tho' the diſcharges of the liver, pancreas, and the other glands into the guts are too abundant, yet the qualities of the juices of different perſons occaſioning thoſe diſcharges, are only in fault, if thoſe bowels or glands are ſound, and not the primary cauſe of the flux, as ſometimes happens in colliquative ones, from abſceſſes and ulcerations. Every phyſician in this light, by reaſoning upon the cauſe and ſymptoms, may determine the cure (if curable) of all Diarrhœa's.

A Dyſentery or bloody flux is a kind of hemorrhage, and proceeds from a too rarefied blood, which is more particularly determined to the meſenterick artery, and which is always over-diſtended in ſuch caſes. This diſtention occaſioning a ſeparation of the *fibrillæ* of the firſt (as was obſerved from injecting the artery) muſt cauſe violent pain and torture, frequent ſtools and a teneſmus, and in the end loſs of ſubſtance, mortification and death. In all fluxes the common excretions are much, if not totally, diminiſhed while they laſt, and none ſo remarkably as that of Urine and the Saliva; for a great thirſt always attends fluxes: The cure of fluxes depends chiefly in a due attention to the cauſes and ſtate of the fluids; revulſion by bleeding, epicacuana-vomits, and gentle evacuations, by toaſted Rhubarb, with aſtringents and abſorbents; a decoction of the *Sima Ruba*, or in powder, with the *Decoctum Chartaceum*, is of ſingular good ſervice in moſt fluxes. Opiates combined with theſe or the like, as the ſkilful Phyſician ſhall ſee proper, are abſolutely neceſſary to quiet and ſooth the racking pain that is common in thoſe caſes, as well as reſtraining the fluxion.

THERE is very often an inflammation attending a Dyſentery and hepatick flux; and ſuch a ſtate of blood generally occaſions a feveriſh pulſe: being too buſy with Opiates, does often miſchief, and vulnerary aſtringent clyſters are attended with ſucceſs in very bad caſes.

THE Iliack paſſion, *Miſerere*, or *Volvulus*, is a folding or doubling of the gut within itſelf, like the finger of a glove, which happens in other guts as well as the *Ilium*, and ſeldom admits of a cure. The pain is moſt exquiſite, and fixt in one part, from the total ſtoppage it creates; moſt violent bilious vomitings accompany the diſtemper, and what ought to be diſcharged downwards, is often thrown out at the mouth, by an inverſion of the periſtaltick motion. Balls of lead, and great quantities of quick-ſilver are given in this caſe, but to no purpoſe for moſt part; and I apprehend the readieſt way to unfold the gut, muſt be by inflation from Tobacco ſmoak, or the like; (which Dr. *Sydenham* has hinted) for, as clyſters cannot reach it, nor diſtend the gut in ſuch manner as to remove the doubling of it, inflation and ſmoak may, in the manner as we ſee a bladder in ſuch a ſituation blown out.

A Teneſmus, or an inordinate deſire of going to ſtool, without much evacuation, or any at all, proceeds from pungent, or viſcid, ſlimy humours, vellicating and ſtimulating the ſphincter to open, as if there was a load of fœces lying upon it: this always attends bloody fluxes, and moſtly other fluxes, as the acrimony of the humours are, and is cured with the diſtemper; but when it is a complaint purely ariſing from eroſion in the *Anus* and *Rectum*, ſoft, mucilaginous clyſters with chalk and lime water, *&c.* perform the cure.

WORMS are bred or hatched in the guts of people of all ages, and without diſpute their *ova* are carried in with the aliment: there are three ſorts of them, generally ſpeaking, found in the inteſtines; the round, or earth-like worm; the flat, or jointed worm, and the *Aſcarides*, or white ſhort worm: but obſervation ſhews ſometimes, that there are worms bred in human bodies of particular figure, not in the leaſt like to any ſpecies yet known. Children are moſtly ſubject to the round worm, and they will cauſe feveriſh diſorders and voracious appetites in them, and a cachexia, or bad juices: the jointed worm is not common, but the *Aſcarides* are for moſt part to people in years. Crude Mercury and all its preparations, deſtroy worms; the *ſemen Sanctonicum* and the Corralline have alſo the ſame effects; but the *Aſcarides*, when they neſtle between the coats of the guts, are not ſo eaſily deſtroyed. I have known clyſters of mercurial water and coliquintida perform the cure, when I have had reaſon to think there were neſts of them within the firſt coat.

A Hemorrhage by the hemorrhoidal veins, if moderate, is of the greateſt ſervice for the preſervation of health, and keeping a perſon free from many bad diſtempers; as *Hippocrates* in his Epidemics and Aphoriſms mentions: But an immoderate flux is as dangerous as the other is healthy, by bringing on a train of evils; which ariſes from the ſame cauſe as other great hemorrhagies, either too much blood, or a vitiated quality: in this condition the perſon languiſhes, loſes his ſtrength, and becomes ill colour'd, as if he had the jaundice, and a dropſy comes on in the fatal ſtage. Revulſion by Phlebotomy, and all the incraſſating and aſtringent medicines are in this caſe to be uſed; the *ſuccus urticorum* with the *Stypticum Helvetii*, in draughts, *&c.* with a courſe of *Bath* waters, under the direction of a Phyſician, will infallibly get the better of ſuch a diſtemper.

THE Piles or hemorrhoidal pain proceed from a ſwelling in the terminations of the veſſels in the *inteſtinum rectum*, and they become varicoſe, full of pure or ſerous blood, often occaſioned by catching cold in the part, or limbs: They are indolent ſometimes, and alſo being inflamed, they will cauſe great pain: Heat and fomentations will make them ſubſide, and ſweat out the humour, and preſent relief comes upon their breaking. If they compoſthumate, a Fiſtula often follows. There are ſeveral kinds of them deſcribed by authors; and they take their names from their ſimilitudes and likeneſſes: Some are internal, others external. Bleeding and gentle emollient purges; anodyne external liniments; fomentations; *Æthiops Mineral* taken in ſufficient quantities; and *Lac Sulphuris* with *Bath* waters, are of the greateſt uſe in all hemorrhoidal ſwellings.

THERE is a diſtemper which may be called the Hemorrhoidal Colick, and it is known by a pain that is fixed about the termination of the *Colon*, and beginning of the *Rectum*, ſometimes occaſioning a ſtranguary, and a moſt uneaſy ſenſation about the *Anus* and Sphincter-muſcle; with coſtiveneſs, and a feeling as if there was a great load preſſing thoſe parts: this proceeds from a plenitude and over-fulneſs of the blood-veſſels in thoſe parts, and is preſently relieved by the bleeding of the Piles; and when that does not happen, leeching thoſe parts will anſwer the end. This is often miſtaken for a nephritick colick; for as the Colon in thoſe parts is often attached to the left Ureter, ſymptoms do ariſe that are common in ſuch caſes; but the urine in this colick is very high-coloured, and the pains or load about the *Anus* in particular in this, which is not in the other.

I deſigned here to illuſtrate what has been briefly ſaid, by a narration of Caſes; but as theſe ſheets have ſwelled beyond my expectation, I ſhall at preſent refer them to another opportunity.

FINIS.

ERRATA.

P. 28. for *Back*, r. *Bark.*
P. 30. for *extrinſically*, r. *intrinſically.*
P. 41. read *intrinſically.*

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